

# **WRITING IN MEDICAL EDUCATION: A STUDENT PERSPECTIVE**

by Emily Pye A thesis submitted  
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## Abstract

The Liason Committee of Medical Education (LCME) requires that faculties of medicine include specific instruction in written communication skills. This study explored medical students' experiences with developing writing competencies and reported the findings of a survey of medical students that examined the relationship among students' 1) self-reported writing competence (writing self-efficacy), 2) self-regulated learning (SRL) strategies, and 3) attitudes towards writing. The online survey was distributed in the fall and winter semester to 320 medical students enrolled in all four years of undergraduate medical education at an Atlantic Canadian university. The four-part survey included scales on writing self-efficacy, SRL strategy use, and attitudes towards writing, each tested for scale reliability. The sample of medical students ( $N = 53$ ) ranked their writing competence high and SRL strategy use high, yet expressed low levels of feedback and writing instruction received from their medical instructors. The use of SRL strategies was positively correlated with perceived writing competence. Students did not have extensive experience with writing in a post-secondary setting. Many students saw the value of writing in medicine, and some expressed interest in attending workshops that could improve their writing. Student perspectives may inform curricular change, specifically the need to make written communication skills explicit in medical education. Students should be taught why effective writing skills are important in clinical practice to ensure writing practices are being valued. The results suggest that workshops to improve writing, and more clear and consistent feedback from teaching faculty, would be welcomed by students.

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## Table of Contents

Abstract .....	ii
Acknowledgements .....	iii
Table of Contents .....	iv
List of Tables .....	ix
List of Figures .....	x
List of Abbreviations .....	xi
List of Appendices .....	xii
Chapter 1: Introduction .....	1
Problem Statement .....	4
Research Question and Objectives .....	6
Scope of research. ....	7
Hypotheses .....	8
Theoretical Framing .....	9
Social-cognitive theory .....	9
Self-Regulated Learning .....	10
Rationale .....	14
Outline .....	15
Chapter 2: Literature Review .....	17
Writing Competence .....	18
Medical students' writing competence .....	18
Discipline-specificity .....	19

Writing instruction .....	21
Feedback and writing .....	22
Writing in Medical Education .....	27
Quality of writing in medicine.....	27
Writing in medical education.....	29
Improving the curriculum.....	33
Writing Self-Efficacy .....	36
Writing self-efficacy and writing competence.....	36
Medical students' writing self-efficacy .....	37
Self-Regulated Learning.....	38
Self-regulated learning and writing competence .....	39
Categorizing self-regulated learning strategies.....	41
Medical students' self-regulated learning.....	44
Attitudes .....	45
Attitudes and writing competence.....	45
Medical students' attitudes towards writing.....	46
Summary.....	48
Chapter 3: Methodology.....	50
Survey Method.....	50
Survey Design.....	52
To participate in the survey, participants entered .....	52
Survey Development.....	53
Demographic information.....	53

Writing self-efficacy scale.....	53
SRL strategy use scale.....	54
Attitudes towards writing scale.....	54
Open-ended question.....	54
Study Population.....	55
Recruitment .....	56
Data Preparation.....	58
Coding .....	58
Missing data .....	59
Scales.....	59
Variables.....	61
Analyses .....	61
Ethical Considerations.....	62
Conflicts of interest.....	64
Chapter 4: Results.....	65
Demographics.....	65
Medical Students' Writing Self-Efficacy.....	67
Medical Students' SRL Strategy Use.....	71
Relationship Between Writing Self-Efficacy and SRL.....	78
Medical Students' Attitude Towards Writing in Medical Education .....	80
Value of writing and willingness to learn.....	80
Students' perceptions of the current state of writing in medical education.....	82
Survey Comments.....	84

Writing self-efficacy.....	84
Attitudes on writing in medicine.....	85
Heavy workload .....	86
Limited writing instruction. ....	86
Feedback in medical education.....	87
Summary.....	87
Chapter 5: Discussion .....	88
Medical Students' Performance.....	88
Writing self-efficacy.....	88
SRL.....	90
Attitudes.....	91
Relationship Between Writing Self-Efficacy, SRL, and Attitudes.....	93
Writing self-efficacy and SRL .....	93
Attitudes with Writing Self-Efficacy and SRL.....	94
Experience with Writing .....	95
Writing in the Medical Education Curriculum.....	97
Writing instruction in medical education .....	98
Feedback on writing in medical education.....	98
Limited space in curriculum .....	100
Potential static learning environment.....	100
Implications .....	102
Study Limitations and Future Recommendations.....	105
Correlational analyses .....	105

Sample size .....	105
Scales .....	107
Limited perspective .....	107
Conclusions .....	108
References .....	111
Appendices .....	131
Appendix A: EPAs and CanMEDS Competencies.....	131
Appendix B: Undergraduate Medical Curriculum.....	137
Appendix C: Original Study Documents.....	138
C1: Survey .....	138
C2: Cover letter to study participants.....	159
Appendix D: Writing Self-Efficacy Scale (Graham et al., 1993).....	161
Appendix E: Sample Size Equation .....	162
Appendix F: Ethics Approval and Extension .....	163
Appendix G: Non-Significant SRL Categories Demographics.....	165
Appendix H: Survey Comments .....	168



## List of Tables

Table 1 Categories and Subcategories of SRL.....	41
Table 2 Schedule for Data Collection.....	57
Table 3 Participant Demographic Information.....	65
Table 4 Students' History with Writing Instruction and Feedback .....	67
Table 5 Mean Writing Self-Efficacy Scores of Medical Students for Each Scale Item .....	68
Table 6 One-Way ANOVA on Demographics and Writing Self-Efficacy .....	70
Table 7 Means and Percent Frequencies of Writing Self-Efficacy Items .....	71
Table 8 Mean and Percent Frequency of SRL Strategy Use of Medical Students .....	71
Table 9 One-Way ANOVA on Demographics and SRL Strategy Use.....	75
Table 10 One-Way ANOVA on Demographics and Organizing & Transforming SRL Category .....	76
Table 11 One-Way ANOVA on Demographics and Reviewing Records SRL Category .....	77
Table 12 Correlations of SRL Subscale Categories with Writing Self-Efficacy.....	78
Table 13 Correlations of Individual SRL Strategies with Writing Self-Efficacy.....	79
Table 14 Students' Attitudes Towards Writing and Learning in Medical Education.....	80
Table 15 Correlations of Individual SRL Strategies with Enjoying Reading Medical Articles.....	82
Table 16 Students' Perceptions of Writing In Medical Education .....	83
Table 17 AFMC's EPAs and Their Respective Competencies .....	131
Table 18 CanMEDS Competencies and Their Respective Educational Outcomes.....	132
Table 19 Writing Self-Efficacy Scale Items .....	161
Table 20 One-Way ANOVA of Demographics and Self-Evaluation SRL Category .....	165
Table 21 One-Way ANOVA on Demographics and Environmental Structuring SRL Category.....	165
Table 22 One-Way ANOVA on Demographics and Rehearsing & Memorizing SRL Category .....	166
Table 23 One-Way ANOVA of Demographics and Seeking Social Assistance SRL Category.....	167

## **List of Figures**

Figure 1. Zimmerman's Cyclical Model of SRL .....	12
Figure 2. Zimmerman's Triadic Analysis of SRL.....	13
Figure 3. Entrustable Professional Activity 6.....	135
Figure 4. EPAs mapped onto CanMEDS roles.....	136
Figure 5. Curriculum Map of the Four Year Undergraduate Medical Education .....	137

### **List of Abbreviations**

AFMC	Association of Faculties of Medicine of Canada
ANOVA	Analysis of Variance
CACMS	Committee on the Accreditation of Canadian Medical Schools
EPAs	Entrustable Professional Activities
ICEHR	Interdisciplinary Committee on Ethics in Human Research
LCME	Liaison Committee of Medical Education
MCAT	Medical College Admissions Test
OSCE	Objective Structured Clinical Examination
SPSS	Statistical Package for Social Sciences
SRL	Self-Regulated Learning
SRSD	Self-Regulated Strategy Development
TCPS2	Tri-Council Policy Statement 2
UGME	Undergraduate Medical Education Office

## **List of Appendices**

Appendix A: EPAs and CanMEDS Competencies.....	131
Appendix B: Undergraduate Medical Curriculum.....	137
Appendix C: Original Study Documents .....	138
Appendix D: Writing Self-Efficacy Scale (Graham et al., 1993).....	161
Appendix E: Sample Size Equation.....	162
Appendix F: Ethics Approval and Extension .....	163
Appendix G: Non-Significant SRL Categories Demographics.....	165
Appendix H: Survey Comments.....	168

## **Chapter 1: Introduction**

Physicians require a wide range of skills, both personal and academic, to achieve quality rapport with patients. One of these skills is communication, which physicians use in every patient encounter, from verbal exchanges to eye contact and body language. Written communication plays an important role in medicine and the delivery of health care, though it may not be as easily observable as other forms of communication. Physicians must be able to communicate in writing with various parties that make up the health care system, including patients, families, colleagues, and other health care professionals. Therefore, the ability to write well is an important skill for physicians to acquire during their medical education.

Educational standards now require that medical students must demonstrate competence in oral and written communication. A competency is defined as the ability to demonstrate encompassing knowledge, skill set, and professional behaviour (Dekker, Schönrock-Adema, Snoek, van der Molen, & Cohen-Schotanus, 2013). A clear set of competencies allows students to self-direct their learning by planning, monitoring, and evaluating the learning process to enhance their professional development (Dekker et al., 2013). The medical education system has recently shifted from a knowledge-based curriculum to a competency-based curriculum (Frank & Danoff, 2007; Frank et al., 2010).

The Liaison Committee on Medical Education (LCME), an accrediting body for medical schools in Canada and the United States, released a list of competencies called Entrustable Professional Activities (EPAs). All medical students must be able to competently perform these EPAs unsupervised before entering their residency (Association of American Medical Colleges, 2014). (See Appendix A)

The Committee on the Accreditation of Canadian Medical Schools (CACMS) and the Association of Faculties of Medicine of Canada (AFMC), the organizations responsible for the accreditation of medical schools in Canada, worked with the LCME to bring EPAs into the Canadian medical education system. Currently, every graduating medical student in every Canadian medical facility must demonstrate 12 EPAs before entering residency (Association of Faculties of Medicine of Canada, 2017).

Prior to the EPAs, there was no agreed-upon common core set of competencies expected of medical graduates. At the time of this study, many Canadian medical schools are using EPAs in conjunction with CanMEDS roles. CanMEDS roles define the competencies required of physicians (AFMC, 2017). CanMEDS is a framework that outlines abilities that physicians require to meet the needs of their patients and the people they serve. These abilities are organized into seven different roles of a practicing physician, including the medical expert, the communicator, the collaborator, the manager, the health advocate, the scholar, and the professional (see Appendix A). Like EPAs, the mandate of CanMEDS is to improve patient care by improving physician skills, and each EPA can be mapped to a CanMEDS role (see Appendix A). For example, written communication is mapped to the role of medical expert, collaborator, communicator, and professional.

What is particularly interesting about the new LCME requirements is one EPA requires oral and written communication competence. EPA 6 requires the students to be able to “Present oral and written reports that document a clinical encounter”, which would require a great deal of writing competence and oral communication skills (AFMC, 2017). In medical education in Canada, students have the chance to develop their writing through the writing assessments incorporated in the curriculum. Writing is used as both a learning tool (writing to learn), and to

demonstrate learning (Lawrence, Galloway, Yim, & Lin, 2013). It is therefore important to both medical students' scholarly and professional pursuits that they possess proper writing skills.

Writing to demonstrate learning is mainly used in the form of academic writing as well as consultation notes. According to Hunter and Tse (2013), the process of academic writing can be broken down into three steps. The first step requires selecting and evaluating information sources. The second step involves creating arguments from the sources using one's own opinions. The third step is writing down these opinions in a structured, coherent, writing composition.

Writing to learn is incorporated into medical education through reflective writing. Reflective writing differs from academic writing in that it is more subjective, and aims to develop a different aspect of students' writing (Song & Stewart, 2012). Reflective writing involves thinking critically and analyzing a topic in order to learn from it (Fernandez, Chelliah, & Halim, 2014). In medical school, reflective writing is a form of review, interpretation, and understanding of experiences that guides present and future behaviour (Wald & Reis, 2010). It is also defined as a physician's ability to critically analyze their experiences and reflect on them to understand and appreciate the way they operate in a health care environment (Donaghy & Morss, 2000).

Whether it be writing to learn or writing to demonstrate learning, there are important motivational and affective factors influencing writing competence (Bulut, 2017). Students' perceptions of writing competence (a concept known as writing self-efficacy) and attitudes towards writing have been reported as two of the most important factors influencing writing achievement. Competent writing also requires the use of effective strategies, particularly self-regulation (Bulut, 2017).

Studies indicate that three covariates (writing self-efficacy, self-regulation, and attitudes towards writing) are linked. Writing self-efficacy works with attitudes towards writing to impact writing competence (Bulut, 2017; Soylu et al., 2017). Self-efficacy and self-regulation are positively correlated (Bernacki et al., 2014; Bruning, Dempsey, Kauffman, McKim, & Zumbrunn, 2013). Self-regulation and attitudes towards learning material are also positively correlated (Hammann, 2005). Some propose that self-regulation strategies would be useless were it not for motivational factors such as self-efficacy and attitudes (Demirören, Turan, & Öztuna, 2016).

These findings would lead one to believe if medical students possess positive beliefs about their writing ability, have a positive attitude towards writing, and are reasonably self-regulated in their learning, their writing competence should be relatively good. In other words, quantifying students' beliefs about writing competence, attitudes towards writing, and self-regulation should lead to a reliable measure of writing competence.

### **Problem Statement**

However, it is unclear if medical students are developing their writing skills to adequately meet the requirements set forth by the LCME. Several studies have found that specific writing instruction has been poorly incorporated into the medical curriculum (Melvin, Connolly, Pitre, Dore, & Wasi, 2015; Smith, Ariail, Richards-Slaughter, & Kerr, 2011; Stephens et al., 2012). Moreover, the new competency-based curriculum may not lead to better preparedness for medical practice (Kerdijk, Snoek, van Hell, & Cohen-Schotanus, 2013). Students may acquire significantly less knowledge in the first years of competency-based medical curriculum than the previous learning-based curriculum.



The literature suggests that students in health care programs in general may not be entirely prepared for the caliber of academic writing expected of them in their program by medical faculty (Miller, Russell, Cheng, & Skarbek, 2015) and that they feel as if their educational background alone is not enough to deal with the demands put on their writing abilities in their respective programs (Melvin et al., 2015).

Despite these troubling findings, very little is known about medical students' perceptions of writing in the context of medical education. Much of the literature is based on the implementation of writing in medical education (Crowson, 2013; Simon, 2013; Stephens et al., 2012). Very few studies have provided medical students' perspectives. Most authors tend to publish snapshots of program outcomes (Bierer & Chen, 2010). It is concerning that medical students have been given little opportunity to weigh in on the discussion concerning writing in the medical education system, especially since they are the ones to directly benefit from any curricular change that may result.

Research on medical students' writing competence is also generally undertheorized. Research is carried out, findings are presented, but very few results are explained by theory. The present study will theorize the findings to provide a better foundation for understanding writing in the context of medical education.

There is also no existing literature we are aware of that evaluates writing self-efficacy, self-regulated learning strategy use, or attitudes towards writing in a medical context. Much of the literature incorporating all three of these covariates exist in research mainly involving students from K-12 (Bandura & Schwartz, 1981; Graham, Schwartz, and MacArthur, 2005; Rosário et al., 2016). It is surprising that these covariates are not studied together in the medical

context, especially since they are linked to writing competence (Brown, Peterson, & Yao, 2016), which is now a requirement of entering into residency.

There may be a discrepancy between what is expected of medical students and how equipped they feel to write successfully in medical education. This is the gap in the literature that the current study intends to address.

### **Research Question and Objectives**

The purpose of this study was to determine how undergraduate medical students enrolled in an Atlantic Canadian university medical program perceived their writing competence, how they used self-regulated learning (SRL) strategies, and what attitudes they had towards writing in medical education. This study included student perceptions of both academic writing (writing to demonstrate learning) and reflective writing (writing to learn). It aimed to generate a new understanding of how medical students perceive their writing competence, and to gain insight of their experiences with learning and writing in medical education. The main study objectives were to:

1. Identify how medical students perceive their writing competence (writing self-efficacy), SRL strategy use, and attitudes towards writing;
2. Determine if writing self-efficacy is linked with SRL strategy use and/or attitudes towards writing;
3. Identify students' experience with writing across their undergraduate and medical education; and
4. Identify issues within the medical education curriculum that interfere with students' ability to write well.

**Scope of research.** This research focused on writing self-efficacy, which is how writers perceive their own writing competence (Ekholm, Zumbrunn, & Conklin, 2015). This is important to keep in mind, as the current study will measure medical students' writing self-efficacy, not writing competence itself.

It will also focus on undergraduate medical students in an Atlantic Canadian university. To fully understand the complexity of developing written communication skills as a physician, there must be an examination of the point in time in which this skill is taught and developed: in medical school.

The following information was retrieved from the university website. Due to an agreement between the researchers and the institution, the university is unnamed. The university used in this study has offered a medical program for 50 years. They are jointly accredited by CACMS and LCME, and to date, the university meets all 131 standards of accreditation. It was the first university to implement EPAs into the medical curriculum in Canada, and uses EPAs along with the CanMEDs roles to deem graduates ready for practice<sup>1</sup>. It is therefore a unique setting in which to study EPAs such as written communication.

The MD program takes four years to complete. The current curriculum was implemented in 2013 and is divided into four distinct phases (see Appendix B). The revised curriculum is intended to enhance the focus on the needs of people living in Atlantic Canada, and better adhere to the accreditation standards. The curriculum incorporates a mix of classroom and clinical education, and the majority of the courses required for the completion of this medical program involve written communication and self-reflection in the form of written passages.

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<sup>1</sup> Citation is not provided for confidentiality reasons. The information was taken from the university website.

At the time of the study, 80 students were granted admission into the medical program per year. That represented an increase in class size from 60 to 80 students per year. Sixty spots are reserved for in-province applicants, 14 for out-of-province Atlantic Canadian applicants, and 6 for applicants from other provinces of Canada or non-Canadian students.

Admission requirements state that students must possess a Bachelor's degree before entering the medical program, excluding exceptional circumstances, so we assume the medical students included in this study have completed a minimum of four years of post-secondary education. Students must also have completed 6 credit hours in English to gain admission, and the Medical College Admissions Test (MCAT), in which there is a Verbal Reasoning section.

The Faculty of Medicine employs over 285 full time faculty members including clinicians, academics, and scientists, part time faculty members (e.g., preceptors), and about 300 full-time academic support staff.

The university provides both students and faculty with opportunities to improve their professional skills. According to the university website, medical faculty are offered various professional development workshops from teaching and learning styles to giving effective feedback. Medical students are offered a range of resources for academic support. Although there is a centralized writing center that medical students are encouraged to visit for generic writing support, there is no discipline-specific writing center in the Faculty of Medicine.

**Hypotheses.** Based on the theoretical and contextual background, for the first study objective, we predicted that medical students will have low writing self-efficacy due to the poor integration of writing instruction in medical education (Crowson, 2013; Miller et al., 2015). We predicted high SRL strategy use because studies indicate that medical students are highly self-regulated (Cho et al., 2017). We also predicted negative attitudes towards writing because studies

suggest that students may not value arts-based concepts such as writing in a science-dominated discipline (Borgstrom et al., 2016; Vivekananda-Schmidt et al., 2011; Walker, 2015).

For the second study objective, we predicted that these three items would be positively correlated. This hypothesis was based on studies that reported positive relationships between self-efficacy, SRL, and attitudes (Bulut, 2017; Bernacki et al., 2014; Bruning et al., 2013; Hammann, 2005; Soylu et al., 2017).

For the third study objective, we hypothesized that students would have a limited background in writing based on studies indicating that students may not have a lot of experience with writing in their undergraduate education (Crowson, 2013; Miller et al., 2015).

### **Theoretical Framing**

Writing is a process that is affected by many underlying elements, some of which are related to writers' motivational processes. This can include writers' attitudes towards writing itself, their beliefs about their writing ability, and the self-regulation of their writing process.

Though there are various theories to explain the complex nature of writing, this study uses Bandura's (1986) social-cognitive theory and Zimmerman's (1989) Triadic Analysis model of SRL as the theoretical framework.

**Social-cognitive theory.** Social-cognitive theory states that learning occurs in a social context with an interaction of the individual, environment, and behaviour (Bandura, 1989). This theory seeks to explain how individuals regulate their behaviour through control and reinforcement to achieve a goal-directed behaviour that can be maintained over time (LaMorte, 2016).

One construct of social-cognitive theory is reciprocal determinism, which states that learning is a result of an individual (possessing their own lived experiences) interacting with

their environment (an external social context, barriers and facilitators) and behaviour (responses to stimuli to achieve goals) (LaMorte, 2016). Individuals are neither autonomous beings, nor merely reflections of their environment; they make contributions to their own motivation and action within a system of reciprocal causation (Bandura, 1989).

Another construct that emerges from, and is unique to, social-cognitive theory is self-efficacy. Self-efficacy is the belief individuals have about their ability to complete a task. This construct of social-cognitive theory is part of the writing process, and in the literature, is referred to as writing self-efficacy, or the beliefs individuals have about their ability to write.

Social-cognitive theory was selected to frame the current research over other theories because it emphasizes social influences on student learning, such as the influence of teaching methods and instruction on student learning and performance (Zimmerman, 1989). Medical students approach writing in medical education with their own educational background and beliefs about writing, and through interactions with their environment, including instruction and feedback, and behaviours such as self-regulation, their writing competence is achieved.

**Self-Regulated Learning.** Social-cognitive theory is deeply rooted in the concept of self-regulation, and is the theory from which SRL emerged (Jouhari, Haghani, & Changiz, 2015). Self-regulation is the ability to control behaviour, emotions, cognition, and motivation using personal strategies to achieve goals (Panadero & Alonso-Tapia, 2014). Self-regulated learning (SRL) is using these strategies in the learning process, and has been linked to the writing process, as competent writing requires effective self-regulation and motivation (MacArthur, Philippakos, Ianetta, 2015).

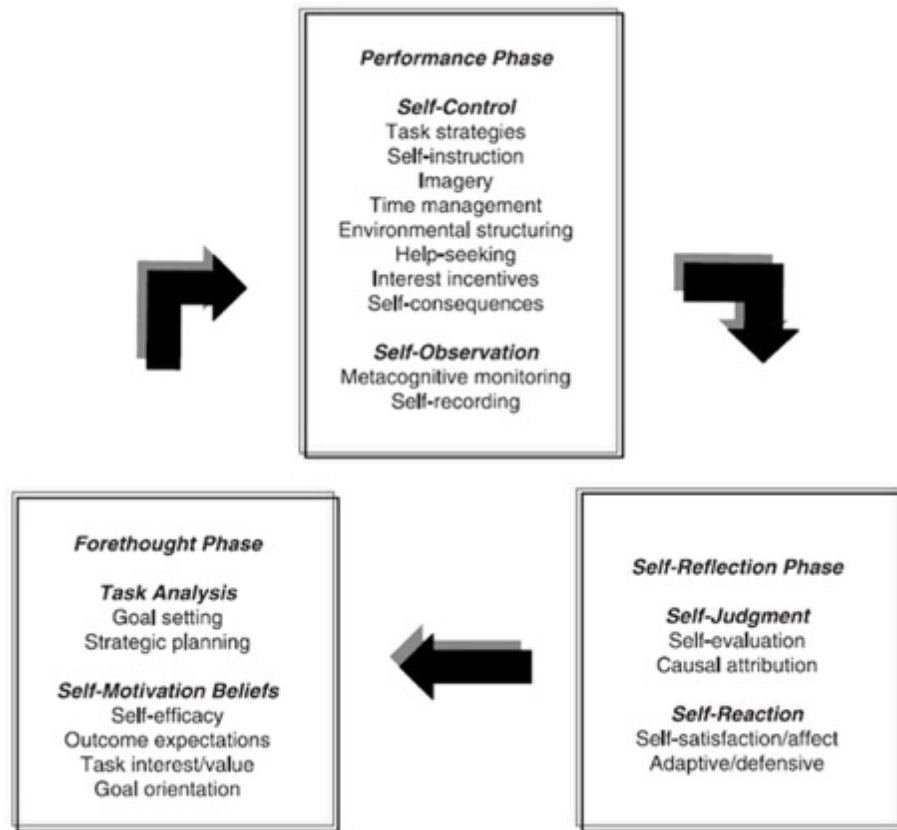
There are several proposed models of SRL. These models are divided into two groups: social-cognitive models that focus on motivational processes (e.g., Boekaerts, Pintrich, and

Zimmerman), and metacognitive models (e.g., Efklides, Winne, and Hadwin) (Panadero, 2017). All models tend to agree that SRL is a cyclical process composed of different sub-processes (e.g., organizing, setting goals, etc.), most commonly represented as a three-phased cycle: planning, performance, and self-evaluation (Ness & Middleton, 2012). This process creates a positive feedback loop, as performing tasks provides feedback for the strategy used in future tasks (Panadero & Alonso-Tapia, 2014). This study, however, will focus on Zimmerman's models of SRL.

***Zimmerman's models of SRL.*** Zimmerman (1990) theorized that learners are metacognitively, motivationally, and behaviourally active participants of their own learning. Metacognitively, students who engage in SRL tend to organize and plan, setting goals for themselves. Motivationally, self-regulated learners are persistent, put in large amounts of effort, and report high levels of self-efficacy and intrinsic task interest. Behaviourally, self-regulated learners engage in knowledge seeking behaviours and self-instruct during the acquisition stage, while self-reinforcing when enacting what was learned (Zimmerman, 1990). Zimmerman therefore believes SRL is a goal-driven process (Panadero, 2017).

In his research, Zimmerman developed three models of SRL, two of which will be used to frame the findings of this study. The first model, created in 1989, explained the relationship among the three types of SRL (behavioural, environmental, and personal) and how it fit with Bandura's social-cognitive theory (Panadero, 2017). This model is called Zimmerman's Triadic Analysis of SRL. The second model explained SRL at the individual level, with metacognitive and motivational processes. This model was first created in 2000, but was later modified in 2009, and is called the Cyclical phases model. The third model of SRL is called the Multi-Level model and represents the four stages in which students gain SRL competency (Panadero, 2017).

*Zimmerman's three-phase cyclical model of SRL.* Zimmerman's cyclical model of SRL aims to describe the process of self-regulated learning. This is the most popular of Zimmerman's models in the literature (Panadero, 2017) and is displayed in Figure 2.



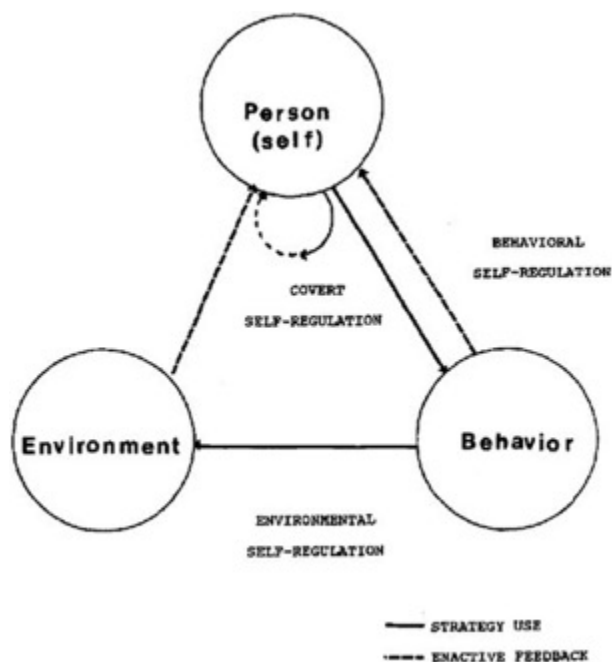
*Figure 1.* Zimmerman's Cyclical Model of SRL. Illustrates the phases of SRL process (Panadero, 2017)

The planning or forethought phase starts before students begin a task, and is where they analyze the task and assess their motivation. Students then assess their learning and adapt to tasks in the performance phase using sub-processes of self-control and self-observation. Students will later self-assess what they learned and how effectively they learned it in the self-reflection phase using sub-processes of self-judgment and self-reaction.

*Zimmerman's Triadic Analysis of SRL.* Zimmerman and Risemberg (1997) use this model of SRL to propose a social-cognitive perspective on writing. They suggest that a writers' self-



initiated feelings, thoughts, and actions are used to achieve writing goals. Environmental, behavioural, and personal self-regulatory processes, also known as the three self-regulatory classes of self-reaction, interact in a feedback loop, improving both the writers' writing skill and the quality of the text created (Figure 1).



*Figure 2. Zimmerman's Triadic Analysis of SRL. How SRL fits into social-cognitive theory (Zimmerman, 1989).*

Environmental self-regulatory processes include the writers' choice of either a social or physical environment in which they write. Writers' behavioural self-regulatory processes include mechanical strategies on writing performance, such as self-monitoring, self-consequences, and self-verbalization. Writers' personal self-regulatory processes make use of cognitive or affective strategies, such as engaging in goal setting, time management, mental imagery, self-evaluation, and governing the production of text through set rules (Zimmerman & Risemberg, 1997).

Social-cognitive theory is therefore a fitting choice to explain the relationship between SRL and writing because of the reciprocal relationship that exists between these three self-

regulatory processes (Zimmerman & Risemberg, 1997). Social cognitive theory identifies two key processes through which SRL is achieved: self-efficacy and SRL strategy use and explains their relationship to student motivation and academic achievement (Zimmerman, 1989).

Zimmerman's (1989) Triadic Analysis of SRL also encompasses the items that were used on the SRL strategy use scale that were adapted from Zimmerman (1989). Therefore, this model was used to frame the findings generated in this study to demonstrate how behavioural, environmental, and personal self-regulatory strategies work in a reciprocal relationship to create a highly self-regulated learner, and how these strategies are related to student writing.

### **Rationale**

There needs to be a larger focus on writing in medical school. Writing in a learning environment introduces its own set of challenges. In a post-secondary setting, students come from a variety of educational and cultural backgrounds. While a common perception of university writing is that it is peripheral to the other, more important areas of post-secondary education, writing is at the very core of the university experience (Hyland, 2013). Writing is used to educate, to develop and communicate knowledge, and to develop reputations amongst scholars and is a major component of the assessments used in medical school to measure performance and professionalism (Hyland, 2013).

Writing self-efficacy is not always obvious. Even the most talented writers may harbor insecurities about their own writing (Pajares, 2007). Therefore, assessing students' self-efficacy beliefs is important to develop a better understanding of students' academic motivation, behaviour, and future choices (Pajares, 2007). Low self-efficacy in writing, not unlike self-efficacy in any skill, can lead to maladaptive academic behaviours. Students may avoid educational opportunities and show less interest in school and academic achievement. Those who

have a low perception of their writing ability tend to avoid opportunities in which they are required to write. This study focuses on these issues from a medical student perspective.

Determining medical students' writing self-efficacy could be a proxy for determining their writing competence, and as a result, their ability to meet the LCME graduation requirements. There needs to be a better understanding of the link between writing self-efficacy, SRL, and attitudes towards writing and how these factors work together to create competent writing in the medical context. Medical faculty could potentially work towards improving how writing is incorporated into the curriculum based on this information about how students learn, and how they feel about their writing, and writing in general.

It is important to determine medical students' writing self-efficacy, as effective writing in medicine has real clinical applications. For example, it has been linked to higher self-awareness (Burks & Kobus, 2012), diagnostic accuracy, communication skills, cultural competency, and most importantly, a more empathetic approach to patient care (Chen & Forbes, 2014; Wald & Reis, 2010). Demonstrating empathy is a key quality for physicians, as it allows them to see through the eyes of the patient, and to understand what is going on from a patient perspective. Reflective writing allows the student to develop this skill, as they are required to think back on clinical encounters and analyze them. Leaving this skill underdeveloped could potentially lead to deficits in patient care.

## **Outline**

This chapter introduced writing in medicine framed from a social-cognitive perspective, and explained how each covariate is expected to impact the results of this study. Chapter 2 presents a review of the literature on writing, writing in medical education, and SRL. The literature review informed the development of the research methodology including the survey

instrument. This step-by-step process is explained in Chapter 3, and includes the methods used, how the data were analyzed, and the ethical considerations. Chapter 4 reports the results of our statistical analyses, organized thematically. Medical students ranked themselves high on the writing self-efficacy and SRL strategy use scales, and relationships existed between these two covariates, and certain attitudes towards writing. Finally, Chapter 5 discusses the findings of this study framed in a social-cognitive perspective, as well as the implications the results may have on writing in medical education, the limitations to this study, and suggests areas of focus for future research.

## **Chapter 2: Literature Review**

This chapter presents a critical synthesis of the relevant literature about medical students' writing competencies and points to the gap in knowledge that this study addressed.

The university library and PubMed databases were searched for this review. Peer-reviewed books, journal articles, and dissertations published in English up until March of 2018 were included, with a focus on articles published in the past four years. Search terms included “writing competence”, “writing”, “medical student”, “self-regulated learning”, and “attitudes”.

An initial search of the literature yielded 7514 documents. Of these, a total of 175 reports met the inclusion criteria and were retained for the review. Abstracts were used in the inclusion/exclusion decision making process. If the abstracts were relevant to the research topic, they were flagged and returned to at a later time to be read in full. Abstracts that were not on topic or in a different language were excluded from the review.

The review is organized into three thematic categories. The first section considers writing competence and health care students' writing ability, the discipline-specific quality of writing competence, and the role feedback plays in student writing. The second section examines the integration of writing practice into the medical education system, and the outcomes associated with effective writing in medicine. The third section considers three covariates that influence students' writing competence: writing self-efficacy, self-regulated learning, and attitudes toward writing. These factors are important in determining medical students' ability to meet the writing requirements set by the LCME. In this section, attention is also given to the literature concerning medical students' performance with each of these covariates. The lack of quantitative data on medical student writing and the impact it has on students' educational outcomes, their clinical skills, or their future well-being, is highlighted (Chen & Forbes, 2014). This will lay the

foundation for what is known about writing competence from the student perspective and help identify the gap this study intends to address.

### **Writing Competence**

What defines a competent writer? Writing competence can be defined as possessing the necessary writing skills to produce a coherent, structured message that uses purposeful ideas, effective use of language, and logical organization (Miller et al., 2015). Learning to write provides students with the opportunity to experience the narrative styles, reflection, argumentation, and basic writing elements of the discipline they are in, and these writing experiences lead to the development of critical thinking, decision making, and problem solving.

In an age with rapid advancements in technology, competent writing has become more of a challenge. Technology plays a role in the deterioration of writing ability, primarily through offering endless distractions (Wilkins, 2017) and providing a “copy and paste” option to writers. It is therefore a crucial time to study writing competence in an educational context to better understand the situation at hand.

Successful writers generally possess qualities linked to knowledge of domain, discourse, and language (Crossley, Roscoe, & McNamara, 2014). Writing competence is often associated with success in academics as well as in the workplace (Crossley et al., 2014). It would therefore prove to be important for students in medicine to be effective writers.

**Medical students’ writing competence.** Medical students’ writing competence is an underdeveloped area of research. We know that medical faculty expect students to have developed strong writing skills in their undergraduate degree that they will use in their medical education (Smith et al., 2011). However, one study involving 2300 students from various universities found that half of these students reported not having taken a course that required a

substantial written composition, like a formal essay or writing assignment (Arum & Roksa, 2011).

Undergraduate faculty reported that the lack of writing instruction stems from time constraints. The number of prerequisites required for science degrees, in addition to the amount of detailed information required to succeed on the MCAT, exacerbates the issue (Ariail et al., 2013).

These findings suggest that many students entering medical education may lack basic writing skills, let alone the knowledge required to write at the scholarly level expected of them in medical school and further into their careers as practicing physicians. Students should demonstrate logic, precision, and clarity in their writing, skills that may or may not have been taught in their undergraduate education.

**Discipline-specificity.** While teaching writing in undergraduate education may seem to be as straightforward as providing a generic writing course for all students, it may be more complex than that. Writing is a discipline-specific skill (Bentley & Brown, 2014; Buzzi, Grimes, & Rolls, 2012; Hunter & Tse, 2013; Hyland, 2013; Mitchell, Harrigan, & McMillan, 2017; Staples, Egbert, Biber, & Gray, 2016). Writing competence can be defined as the ability to effectively articulate the knowledge and skill sets of the discipline (Buzzi et al., 2012).

Writing self-efficacy is a discipline-specific construct. This means that there is no global measure of assessment (Bandura, 1977; Bruning et al., 2013). Bandura (1977) acknowledged very early on that context is important for developing self-efficacy. Students entering a new discipline need to develop their own beliefs about their competence in this new context, including their ability to write.

Disciplines have distinct ways of presenting research, identifying issues, asking questions, challenging peers, and discussing literature (Hyland, 2013), and students must adapt to their disciplinary standards to thrive in their academic environments. For example, there are studies that report disciplinary differences between complexity of phrases (Staples et al., 2016), grammar (Jiang & Hyland, 2015), and citing behaviours (Shi, 2016).

Disciplines are comparable to communities; members share a set of beliefs, conventions, categorizations, and ways of doing things (Hyland, 2012). The context of discourse amongst disciplines is therefore important in understanding and producing language. Context consists of: knowledge about cultural and interpersonal situations, those taking part in the discourse, and the texts and conventions of communication. Disciplines essentially provide a schema allowing academics to effectively process and evaluate each other's performances. Engaging in discipline-specific discourse creates meaning, and populates the field with academics who share understanding and ways of communicating ideas (Hyland, 2012).

Because disciplines have their own writing styles and conventions, many writers often struggle with transferring their writing skills from one context (or discipline) to another (Mascle, 2013). Novice writers dedicate much of their conscious thought to the very basics of written communication, including word choice, spelling, and constructing sentences (Bruning et al., 2013). Only when the basics of writing composition is understood can working memory be freed up for more complex processes, such as idea generation and organization. This applies to students writing in an unfamiliar context. They must learn the very basics of the context in which they're writing in, such as discipline-specific jargon, before understanding how they're expected to organize their writing content and generate novel ideas in the area.



What does that say about writing in medicine? Medical students come from a variety of disciplinary backgrounds, and their writing competence is therefore specific to their disciplinary education and training (Smith et al., 2011; Miller et al., 2015). A student can be a competent writer in one discipline, but when introduced to a health care writing environment, is considered a novice. Novices in a field acquire writing competency over repeated exposure to writing practices, analyzing examples of the genre, and receiving feedback from experts in the field. Writing skill may be transferable from discipline to discipline, but the important rhetorical attributes are not.

**Writing instruction.** The skill of writing effectively within a discipline can be taught. Discipline-specific writing instruction interventions and resources are linked to better writing competence (Andre & Graves, 2013; Ariail et al., 2013; Hunter & Tse, 2013; Smith et al., 2011).

However, in most recent literature, Self-Regulated Strategy Development (SRSD) is an evidence-based approach that is gaining a lot of attention by making a significant difference in students' writing ability, being rated as most favorable by multiple evaluators (Harris, Graham, Friedlander, & Laud, 2013). It also links writing self-efficacy, SRL, and attitudes towards writing. SRSD instruction involves the interactive learning of powerful strategies for writing both within and across genres, accounting for discipline-specificity of writing. It teaches students the knowledge needed to use these writing strategies, as well as teaching strategies for self-regulating the writing strategies (Harris et al., 2013). Unlike other writing instruction that focuses on the basic skills associated with effective writing like planning, drafting, evaluating, and revising, SRSD incorporates the use of self-regulated strategies, such as goal-setting, reflection, and self-evaluation of progress (Blake, MacArthur, Mrkich, Philippakos, and Sancak-Marusa, 2016).

SRSD is a six-stage process that increases students' ability to self-regulate, with each successive step leading further into the development of self-regulation (Blake et al., 2016). It starts with developing enthusiasm and positive attitudes towards the topic, acts as a guide through all the SRL strategies, and ends with students' self-regulating on their own; a gradual release of writing responsibilities to the students (Blake et al., 2016; Harris et al., 2013). Just after five weeks of this writing instruction technique being implemented with college students, the instructors noticed a significant difference between the students in the SRSD curriculum and the students who were in the basic curriculum. The students learned to be in control of their writing, worked toward their writing independence, and took ownership of their work (Blake et al., 2016).

**Feedback and writing.** Feedback is an important contributor to developing writing competence (Bijami, Pandian, & Singh, 2016). Feedback on student writing can come from a variety of sources, and can be structured in different ways. In medicine, writing exercises have a maximum impact when there are a variety of resources delivering critical external feedback (Walker, 2015). Institutional, instructor, and peer feedback are sources of feedback on student writing that are popular in the literature. It has been reported that there is a strong positive connection between being given feedback and using it, as well as a positive association existing between SRL and students' use of feedback (Brown et al., 2016).

***Institutional feedback.*** Effective writing resources facilitate the development of students' writing competence in post-secondary educational settings (Andre & Graves, 2013; Arial et al., 2013; Gopee & Deane, 2013; Smith et al., 2011).

Writing centres have existed since the early 1970's, and are now common across universities and within non-health care programs (Smith et al., 2011). They have been regarded

as key enablers for students to develop the skills they need to analyze, plan, and answer questions in an appropriate academic style (Gopee & Deane, 2013). However, these centres are not always health care specific (Andre & Graves, 2013), and they rarely teach particular features of writing in a students' discipline. For example, the university in which the present study is situated does not have a medicine-specific writing centre, but rather a general writing centre that provides generic aid to students of varying disciplinary backgrounds.

These general writing centres may not address the discipline-specific writing needs of students. General writing centres can in fact add to student writing apprehension. One study noted that international students have reported that after seeking help from the writing centres, it confused them further, as there were inconsistencies in the verb tenses being taught (Maringe & Jenkins, 2015).

Discipline-specific writing centres in medicine, on the other hand, have shown marked success rates (Smith et al., 2011; Ariail et al., 2013). Here, medical students are taught about writing styles, organization, delivery, the study of argument, and rhetoric. These writing centres serve as a resource for students, faculty, and staff to access professional writing instruction (Ariail et al., 2013; Smith et al., 2011). Lectures and workshops provided by discipline-specific writing centres, as well as one-on-one sessions, can maximize the development of their narrative competence, self-awareness, and humanistic practice without the additional pressures of being graded. Students that have used discipline-specific writing centres report the centres meet all their needs and that the faculty are helpful and competent (Smith et al., 2011). They report improvements in their writing, and in their confidence in proofreading, editing, and developing ideas in the future. Some even report that the writing centre was one of the main reasons they chose to attend the university. Blind evaluators have also been able to determine which writing

samples came from students who received help from medical writing centres, indicating there is significant improvement in the writing skills of those that use the centre as opposed to those who do not (Smith et al., 2011).

In nursing studies, writing instruction is acknowledged as the method of choice to familiarize students with the unique discourse that exists in nursing, through the practice of higher thinking strategies (Andre & Graves, 2013). However, only 6% of nursing programs in Canada have a discipline-specific writing course. Half of the programs have no course at all, and the rest required the completion of a generic writing course (Andre & Graves, 2013).

Implementing writing centres that teach discipline-specific modes of thinking would likely reduce the need for instruction in the classroom, and leave fewer students without the proper resources to develop their writing skills.

Writing interventions have also been reported to increase writing competence in students in health care professions (Miller et al., 2015). Writing interventions focus on teaching skill-building in effective writing (e.g. organization, developing a main theme, coherence, choosing effective vocabulary, achieving good flow and rhythm, and properly presenting the work) (Miller et al., 2015). These interventions have successfully improved organization, word choice, sentence fluency, conventions, and presentation. One difficulty presented is that voice was not developed by these writing interventions. Voice may be more concrete and difficult to change with an intervention, as it consists of mainly students' thoughts and beliefs (Miller et al., 2015). Reflective writing assignments in health care education are subjective, and depend on the students' thoughts and beliefs. As a result, writing interventions may not be effective in improving students' performance on this form of writing assignment.

**Peer feedback.** Peer feedback is also identified as being an important resource for improving students' writing ability. Medical students report that speaking with peers one-on-one or in group discussions helps develop their writing skills, because they gain different perspectives from a shared experience, and listen to other students' reflections (Vivekananda-Schmidt et al., 2011).

In particular, English as a Second Language (ESL) and English as a Foreign Language (EFL) students report valuing peer feedback and considering it a worthwhile activity (Lin & Yang, 2011; Mahfouz, 2010). Many times, this feedback is received online as an e-mail conversation between one student who is a native English speaker, and an ESL or EFL student. In this way, the peers could edit the text being sent, and ESLs or EFLs could imitate the written language of the native English speakers, or create their own sentences (Mahfouz, 2010). This collaborative approach to a writing project improves writing skills, in terms of structure, language functions, vocabulary and phrases, style, and content and organization of ideas (Mahfouz, 2010). It also improves self-reflection through peer interaction and self-confidence (Lin & Yang, 2011; Mahfouz, 2010).

**Instructor feedback.** Feedback from an instructor has a positive impact on student performance in writing and plays a critical role in developing students' writing skills (Bijami et al., 2016). Written feedback on writing allows a one-on-one moment for instructors and their students (Mahboob, 2015). Instructors take the time to focus on individual students' writing samples, and the students therefore benefit by receiving comments specifically about their writing.

Students themselves have reported the benefit of receiving quality feedback on their writing compositions from their instructors (Bijami et al., 2016; Kiss et al., 2017). Students have

indicated that meeting with their tutors in one-on-one sessions to receive feedback on their reflective writing was helpful, and guided their progress in the right direction (Vivekananda-Schmidt et al., 2011).

Students tend to prefer direct feedback, as opposed to indirect feedback (where instructors use general comments to allow the students to fix the error themselves) or student-teacher conferencing (Bijami et al., 2016). In situations where they are given indirect feedback, students preferred finding errors in their own work, and that they retained more this way.

In medicine, it has been determined that the most effective form of written feedback from instructors is given in a positive tone (Schartel, 2012; van de Ridder, Peters, Stokking, de Ru, ten Cate, 2014) and tailored to students' individual reflective level to stimulate students to reflect on a slightly higher level (Dekker et al., 2013). Positive feedback led to a significant increase in medical students' self-efficacy, satisfaction, and performance (van de Ridder et al., 2014). Negative feedback can lead to an emotional response and cause dissonance between the students' self-evaluation and external critique (Schartel, 2012). However, medical students have reported the writing feedback they receive often comes from residents on clinical rotations, which seems to lack standardization. For example, residents give feedback based on their own level of comfort with giving constructive criticism, and the time they have available to give proper instructions and feedback varies from resident to resident (Melvin et al., 2015).

Student-teacher conferences are also seen as valuable feedback sessions by students, who report having had a better learning experience and feeling more engaged in the writing process (Bijami et al., 2016).

Though there are many positive benefits to instructor feedback, there are also downfalls noted as well. Accepting feedback is one of the greatest challenges as a writer, and can lead to a

sense of a loss of control (Taggart & Laughlin, 2017). When students report negative experiences with feedback, often times it has to do with hierarchy, disrespect, and confusion. This is understandable, as students are generally less experienced writers than instructors, and it can therefore be a more emotional and distressing process receiving feedback on their writing. Students have indicated they need more time and space, respect, and more clearly worded and consistent instruction (Taggart & Laughlin, 2017).

Undergraduate EFL students in particular have reported being dissatisfied with their instructors' feedback on writing (Agbayahoun, 2016). Many students wish their feedback could be more focused on content rather than just accuracy in writing.

And though it is important to keep all of this in mind, as instructors it is important to remember to give feedback on an individual basis, as every student learns differently (Bijami et al., 2016). Some students may respond well to written commentary, while others could benefit more from oral feedback (Bijami et al., 2016). Instructors would therefore benefit from familiarizing themselves with their students' learning styles to individualize their feedback.

### **Writing in Medical Education**

**Quality of writing in medicine.** Writing in medicine has gained a fair amount of notoriety over the years (JAMA, 2017). Known for its monotony, jargon, wordiness, clumsiness, and lack of clarity, writing in medicine has developed a bad reputation in the academic community (Bagg & Fred, 2013; Collier, 2017; JAMA, 2017). When medical journals are compared to other literary periodicals, there is a stark contrast in the quality of the texts (JAMA, 2017). Medical writing can be difficult to read, even for medical researchers (Collier, 2017).

This has a major effect on the impact medical research has on the community, as poor communication limits how effectively medical researchers can get their points across (Collier, 2017). But is there a reason for poor written communication within the field of medicine?

Some argue that physicians often believe the importance doesn't rest on how you say things, but rather what you're saying (JAMA, 2017). This emphasizes the importance of objectivity and clarity, but leaves out other important elements required to produce a coherent and quality text (JAMA, 2017).

When writing for publication, complex medical research often times has certain words, phrases, or acronyms that are hard to avoid, as well as shorthand, leading to confusing texts (Collier, 2017). Such tactics can also disguise trivial science with overcomplicated wording. Institutions also tend to reward frequency of publication rather than the quality of publications so many writers in medicine are striving to get as much published as possible, rather than taking the time to focus on the quality of the writing and the messaging of the content. The write-up of research also happens at the very end of research, so fatigue and impatience can play a role in why writing in medicine is poor (Collier, 2017).

When considering consultation notes, electronic medical records could play a role in poor written communication. Physicians may "copy and paste" their encounters with patients in their files, but this increases the chance of replicating errors that have crept into the files, as well as preventing the proper digestion and synthesis of a patient's story (Simon, 2013).

When medical students reflect on patient encounters, this style of writing can be interpreted as unscientific because of its subjectivity (Song & Stewart, 2012). Objectivity is often valued as "real science", meaning the only way to approach problems in science is to approach it from a non-biased, third-party viewpoint. Physicians often see themselves as already adept at



introspection and empathy, as they have chosen a career path dedicated to helping people. Often times, it could be seen as patronizing to be “taught” how to care for patients, and then have to write about it later (Song & Stewart, 2012). For medical students, it could be that exams may seem much more relevant and important than learning to write.

With the rising importance of communication in society, writing has been increasingly incorporated into academic discourse (JAMA, 2017). Many patient-related errors in health care have been linked to deficiencies in written communication (Melvin et al., 2015). Poor written communication can lead to a perceived lack of professionalism and knowledge, as well as misunderstanding, compromised patient safety, and personal, institutional, and professional embarrassment (Honeycutt & Latshaw, 2014). If doctors are not informed about how to communicate through writing, errors can occur that can negatively impact a patient’s health, especially during the referral process where important information about the patient must be relayed to other health care professionals. To prevent such errors from occurring and improve the quality of written communication, these writing deficiencies should be addressed in medical school.

**Writing in medical education.** Writing plays a role in medicine and medical education (Ariail et al., 2013; Crowson, 2013; Liao & Secemsky, 2015; Stephens et al., 2012). Writing in medicine has been identified as a relevant pedagogical tool to reinforce students’ understanding of the concepts being taught and their ability to think critically (Ariail et al., 2013; Cowen, Kaufman, & Schoenherr, 2016). Writing is also a useful advocacy tool that is well-received by medical students (Gross & Aronson, 2013). Writing in medical education has been used to promote reflection, and is used as a pedagogical tool (Smith et al., 2011). Writing is also used to teach narrative medicine. Narrative medicine is an interdisciplinary approach to medicine that

requires recognizing, absorbing, interpreting, and being moved by patients' stories, and incorporating them into clinical practice, research, and education (Charon, 2006). Writing activities also ensure that students get practice communicating within their professional environment, using terminology and conventions that are commonplace in medical discourse.

***Academic writing and clinical documentation.*** Writing academically is the vehicle for communicating medical knowledge, transporting break-throughs, innovations, and observations through time, and is a key component of career advancement in medicine (Crowson, 2013; Simon, 2013).

Writing in the form of clinical documentation is the primary form of communication between health care professionals in the area of patient care (Simon, 2013; Stephens et al., 2012). Students must be able to hear their patients' stories, interpret and respond to these stories, construct a good narrative and report information in a way that is clinically appropriate (Simon, 2013; Stephens et al., 2012). This is an active process, which involves a balance of incorporating important medical events being discussed by the patient and capturing their unique personality, but also keeping it concise, dispassionate, and non-judgmental (Simon, 2013). Good narratives bring the patients' stories to life when physicians return to the charts, and communicate medical findings effectively with other health care professionals. When patients request access to their medical records, a good narrative about the patient-physician encounter contributes to a trusting relationship. Good writing minimizes the risks and maximizes the benefits involved with this information sharing (Simon, 2013).

***Reflective writing.*** Reflection is the metacognitive process of creating a better understanding of oneself and one's experiences to inform future action (Dekker et al., 2013). In medical education, reflective writing enables students to examine their own attitudes and beliefs

in relation to their past experiences (Stephens et al., 2012). Reflective writing teaches students to slow down and examine the patient-physician encounter in great depth and detail, immersing themselves in the story the patient presents, and the process of diagnoses. Encouraging students to delve into an enriched account of their experiences in the field of medicine enhances their understanding of patients' perspectives, as well as creating an understanding of their own clinical skills. Reflective writing intends to improve medical students' capacity to be attentive, self-aware, curious, and willing to recognize and correct errors, as well as building decision-making skills in clinical settings (Epstein & Hundert, 2002; Stephens et al., 2012). Reflective capacity has been linked to improving diagnostic accuracy, which is not necessarily surprising, as it ensures a more empathetic approach to clinical encounters (Wald & Reis, 2010).

Reflective writing is important to medical student learning, and challenges the way students think (Braun, Gill, Teal, & Morrison, 2013; Fischer, Haley, Saarinen, & Chretien, 2011). Students' reflective writing provides insight into their own personal journey to becoming a health care professional. It is important for students to engage in reflective writing practices as they seek to discover what medical practice means to them, their patients, their colleagues, and society (Johna & Dehal, 2013). There is a range of reflective writing practices. This might include responding to specific questions to addressing meaningful or difficult experiences, with topics including professionalism, ethics, the health care system, and patient-centered care (Walker, 2015). Most reflective writing assignments use real encounters that students have experienced to reflect on, while others get more creative and allow students to create fictitious characters, or write a poem or song (Walker, 2015).

Reflective writing practices are important in exploring students' points of view, and to review or examine an experience or memory (Cowen et al., 2016). Writing allows students to

foster self-expression and organizational abilities, as well as observation and descriptive skills, skills that are relevant to clinical thinking and medical practice (Cowen et al., 2016). Physicians have shown more self-awareness and interpersonal awareness in clinical encounters after engaging in reflective writing practices (Burks & Kobus, 2012), and more cultural competency and communication skills (Chen & Forbes, 2014). Writing is important to recognize and reflect on emotions and feelings (Braun et al., 2013; Williams, Wilson, & Olsen, 2005), and to better integrate and understand these feelings as well as internal thoughts, values, knowledge and attitudes that they experience during or following an encounter (Burks & Kobus, 2012).

Narrative writing in medicine encourages students to become patient advocates (Liao & Secemsky, 2015), and leads to a better understanding of the patient and better patient care (House, et al., 2013; Simon, 2013). It also allows students to reflect on the approach they used in a clinical encounter and make necessary adjustments for the next time (Braun et al., 2013). Reflective writing is also important for students' personal growth and satisfaction (Simon, 2013).

Empathy is emphasized in the literature as an important skill developed through reflective writing practices (Burks & Kobus, 2012; Chen & Forbes, 2014; Quince, Parker, Wood, & Benson, 2011; Quince Thiemann, Benson, & Hyde, 2015). Training in self-reflection may help students to recognize, regulate, and demonstrate empathy within clinical and professional encounters, and with more empathy comes more effective health care providers (Burks & Kobus, 2012). Female medical students have displayed significantly higher levels of affective empathy than their male counterparts in every year of medical education (Quince et al., 2016; Quince et al., 2011).

Physicians who demonstrate exceptional reflective capacity are better able to relate to the patient, understand their situation, and know the best way in which to apply their clinical skills.

Patients receive a higher quality of care, as the physician is more attentive to the patients' needs, and enhances patients' comfort, self-efficacy, trust, and satisfaction. Physicians benefit as well, as reflective writing practices prevent compassion fatigue, burnout, and alienation, and are linked with greater job satisfaction (Quince, et al. 2011, Quince et al. 2015; Reis, Wald, Monroe, & Borkan, 2010). When physician burnout occurs, patient care and satisfaction decreases, and incidence of medical errors and malpractice increases (Chen & Forbes, 2014), so keeping burnout at bay is in the best interest of all parties involved. Loss of empathy occurs in the early years, therefore early reflective writing interventions targeting compassion loss can help prevent physician burnout (Chen & Forbes, 2014).

Not only does reflective writing have an impact on clinical skills, but it also appears that it has an impact on students' classroom outcomes. Stephens and colleagues (2012) report that first year medical students' performance in a course that emphasizes self-reflection is associated with end-of-medical-school GPA and exam performance. They hypothesize that this could be a result of the unique combination of self-regulation, experience, and communication (both written and oral) that blend elements of cognition and communication together to create success in medical school. This not only stresses the importance of students' writing competencies in medical school, but suggests the development of proper writing abilities and self-reflection skills can potentially predict long-term educational success (Stephens et al., 2012).

**Improving the curriculum.** The many benefits of possessing good written communication skills supports the need for greater integration of humanistic curricula into medical education. Implementing this change would require a shift within the culture of medicine towards the acceptance of the arts within the field (Burks & Kobus, 2012; Johna & Dehal, 2013). Behaviour-oriented, non-biomedical education in medicine, fusing scientific

knowledge and creative thinking, is important in developing well-rounded physicians (Arntfield, Slesar, Dickson, & Charon, 2013; Walker, 2015). If students are given the freedom and space to be creative and connect with each other, this should lead to a generation of physicians who exhibit more compassion and a more human element in their practice (Ramesh, 2013).

Proficiency in writing has not been broadly incorporated into the North American medical education system (Smith et al., 2011). Evaluation of writing skills in medical school is not mandatory, and often these skills are not taught in the classroom (Stephens et al., 2012). Faculty report that there are many time-related issues preventing them from including writing in the curriculum (Ariail et al., 2013). Students report that they learn their written communication skills primarily from physicians and residents during on-call shifts, not from a classroom setting (Melvin et al., 2015). Learning by trial and error with staff physicians and residents has not proven to be the most effective way to develop written communication skills. Few medical schools offer formal writing training for students (Crowson, 2013). This is concerning for a number of reasons. Students who wish to go on and attempt to make contributions to the field of medicine and further their careers are doing so with very little education in writing for the discipline of medicine (Crowson, 2013). This could lead to author frustration, manuscript rejection, and time lost.

Students also may not see benefit of reflective writing (Walker, 2015). Reflective writing is context specific, like many other elements in medical education (Moniz et al., 2015). One study reports that it takes fourteen reflective writing assignments to properly predict performance, and requires four or five assessors (Moniz et al., 2015). This brings into question the feasibility of reflective writing assignments as an assessment tool (Moniz et al., 2015). Using reflective writing as an assessment tool may change the purpose of reflective writing for medical

students. Instead of writing for discovery, students will be writing for performance, and the art of reflecting may be lost in translation (Moniz et al., 2015).

A good curriculum cannot be seen as a waste of time by the students and faculty (Song & Stewart, 2012). To address some of the concerns outlined earlier in this section about why writing is so poor in medicine, perhaps we should change the way writing instruction is presented. As Song and Stewart (2012) propose in their research, reflective writing should be presented not as a way to “teach” students how to care, but rather how to enhance the skills they already possess. As well, Collier (2017) suggests medical faculties should offer courses in how to simplify some of the language used in medical writing, similar to how students are taught how to verbally communicate simply with patients. They also propose institutions should find ways to reward writers in medicine who make an effort to appeal to a wider audience.

Good writing cannot be replaced by technological and electronic advances (JAMA, 2017). However, strategies to engage medical students in writing involving technology has been proven effective for many students (Fischer, Haley, Saarinen, & Chretien, 2011). For example, certain students preferred reflective writing assignments as part of an online blog rather than traditional writing exercise when given the choice, and highly rated the exercise (Fischer et al., 2011).

Though expertise in writing is not a necessity, proper reflection does require a stable and nurturing environment (Ramesh, 2013). Medical teaching faculty, though many may have backgrounds in the sciences or linguistics, often have not received any specific training in education (Leventhal, 2013). Reflective writing is the most frequently supported means to assess professionalism by medical educators (Braun et al., 2013), and allows educators a window into curricular elements that may need to be adjusted (Williams et al., 2005). The direction given to

students regarding reflective writing often varies (Walker, 2015). With such large amounts of scientific data to tackle, medical educators seldom devote much attention to written communication skills (Simon, 2013).

### **Writing Self-Efficacy**

Writing self-efficacy is one's own confidence in their competence as writers (Villalón, Mateos, Cuevas, 2015). Self-efficacy is a concept that emerged from Bandura's (1986) social-cognitive theory. In line with Bandura's (1986) social-cognitive theory, Bruning and colleagues (2013) argue that writing self-efficacy should be framed in ways to yield information about successfully meeting psychological, linguistic, and behavioural challenges in writing. They break down writing self-efficacy into three components: self-efficacy of ideation (psychological), conventions (linguistic), and self-regulation (behavioural). Ideation involves generating ideas, conventions are expressing these ideas using written language-related tools, and self-regulation involves managing writing decisions and behaviours (Bruning et al., 2013).

Writers have a tendency to form strong impressions of their own writing, ranging from judgements of their success on certain tasks, to their anxiety and frustrations (Bruning et al., 2013). Writing self-efficacy is therefore a fairly stable construct, but with proper interventions, it is a skill that can be developed (García-Sánchez & de Caso-Fuertes, 2005). Motivational training is what appears to affect students' self-beliefs the most, which is logical since self-efficacy is the biggest predictor of motivation.

**Writing self-efficacy and writing competence.** Writers' beliefs about their own writing competence has been shown time and time again to be positively correlated with writing competence (Brown et al., 2016; Bruning et al., 2013; Jalaluddin, Paramasivam, Husain, & Bakar, 2015; Kahraman, 2012; MacArthur et al., 2015; Mascle, 2013; Miller et al., 2015;



Mitchell et al., 2017; Prat-Sala & Redford, 2012; Sanders-Reio, Alexander, Reio, & Newman, 2014; Schunk & Swartz, 1993; Soylu et al., 2017; Tanyer, 2015; Villalón et al., 2015; Woodrow, 2011). It was reported that even after past writing performance and aptitude were accounted for, writing self-efficacy made an independent contribution to writing success, which speaks to the impact writing self-efficacy has on writing achievement (Ekholm et al., 2015).

Writing self-efficacy can also be used to predict writing competence (Schunk & Swartz, 1993; Villalón et al., 2015). In fact, writing self-efficacy is a more consistent predictor of writing competence than other motivational variables, including writing apprehension and writers' perceived value of writing (Artino, 2012; Villalón et al., 2015). One explanation for this observation is that the confidence writers possess in their own writing competence helps them generate greater interest in a writing task they are engaged in, and deal more appropriately with obstacles that may arise during the writing process (Villalón, et al., 2015).

There was one study that reported no correlation between communicative self-efficacy and observer's rate of communicative competence (Tore et al., 2017). They proposed that maybe self-reported communication skills are not the most reliable sources of data. However, one would argue that gaining self-efficacy perspectives is not always meant to directly reflect competence, but rather gain access to an individual's own personal experience with a specific topic.

**Medical students' writing self-efficacy.** Students' writing self-efficacy in medical education is a topic that has not been well researched in the past although research has been conducted in the broader field of health care. That research indicates that undergraduate students experience fear and dread when faced with a writing assignment, and often do not feel they possess the right skills to create a seamless document for their academic work (Miller et al., 2015). Students also express concern about their writing proficiency and perceived writing

deficits, but also expressed the desire to pursue graduate studies and other leadership opportunities to further their careers. This educational path requires solid writing competencies, and as a result, poor writing could severely limit students' progress in their education and career (Miller et al., 2015).

In comparison, there has been a fairly significant body of research conducted on medical students' self-efficacy (Bierer, Prayson, & Dannefer, 2015; Woods, Pasold, Boateng, & Hensel, 2012; Young et al., 2012; Zachariae et al., 2015). Medical students' self-efficacy is linked to various clinical outcomes, and is shown to change over time with in-class and clinical experiences (Bierer et al., 2015; Hagemeier, Hess, Hagen, & Sorah, 2014; Stroben, Schroder, Dannenberg, Thomas, Exadaktylos, & Hautz, 2016; Woods et al., 2012, Young et al., 2012). For example, medical students' self-efficacy is linked to enhanced communication skills, being more comfortable to speak in high-risk environments, and better patient care (Loeb et al., 2018; Woods et al., 2012). Medical students' research self-efficacy has been linked to interest in research careers (Bierer et al., 2015), which is similar to the present study's goal of determining if writing self-efficacy is linked to students' attitudes towards writing.

One study aimed to create a measure to assess medical student patient-centeredness self-efficacy, and developed a possible scale which included items that were organized into exploring the patient perspective, sharing information and power, and dealing with communicative challenges (Zachariae et al., 2015).

### **Self-Regulated Learning**

SRL is linked to many positive outcomes such as academic achievement (Ruban, McCoach, McGuire, & Reis, 2003), literacy skills (Schunk & Zimmerman, 2007), and math skills (Metallidou & Vlachou, 2010). SRL can also be used as a predictor for academic success

(Broadbent & Poon, 2015). Time management, metacognition, effort regulation, and critical thinking were the SRL components that were positively correlated with academic success.

Much research has been dedicated to the study of SRL in classrooms. An overview by Zimmerman (1990) discusses the idea of SRL and its impact on student achievement. Students' SRL involves three key features: their use of SRL strategies, their responsiveness to self-oriented feedback about learning effectiveness, and their interdependent motivational processes. Self-regulated students therefore use self-learning strategies to achieve their academic goals based on self-assessed feedback about learning effectiveness and skill.

Using SRL interventions in classrooms can be beneficial. SRL skills can be taught to students of all ages, but should be specifically emphasized (Zimmerman, 1989) and provided with proper instruction (Brydges et al., 2015). There are varying effects of the different SRL models at each developmental or educational level. For those at the higher education level, such as medical students, learners may benefit most from interventions stemming from socio-cognitive models, such as those of Boekaerts, Pintrich, and Zimmerman (Panadero, 2017). Studies suggest interventions aimed at self-efficacy and goal setting (motivational and emotional processes) may have a higher impact than other types of SRL interventions. For example, Sitzmann and Ely (2011) state that amongst higher education students, goal level, persistence, effort, and self-efficacy are the four biggest predictors of SRL, all having motivational value, which are encompassed in the socio-cognitive model.

**Self-regulated learning and writing competence.** Effective self-regulation has also been hailed as an essential component of writing competence (Graham and Harris, 2000; Zimmerman & Risemberg, 1997). Writing is a complex process involving knowledge, skill, and strategies of the writer, and requires motivation and self-regulation (MacArthur et al., 2015).

This relation between writing and SRL assumes that writers will produce successful writing compositions if they are able to regulate their writing process (Flower & Hayes, 1981). This puts emphasis on the development of the composition process, and explains why many strategies for writing instruction focus on the development of self-regulatory processes like planning, reviewing, and editing compositions (Harris & Graham, 1996).

However, some studies also show that writing exercises have an impact on self-regulating processes. One study by Nückles, Hübner, and Renki (2009) reports that writing can serve as a means for students to develop the self-regulation of their learning process. Students were instructed to write down their reflections of previously-presented learning content, and were given prompts to elicit important strategies involved with SRL. The group of students that was prompted with the sub-processes involved with cyclical model of SRL (organization and elaboration of learning contents, the monitoring of their understanding, and the planning of remedial strategies in case of perceived comprehension problems) were most effective at comprehending the subject matter (Nückles, Hübner, & Renki, 2009). Interestingly, the same study also concludes that writing the learning protocols without any concrete instructional guidance leads to poor learning outcomes. This is relevant in the research involving writing in medical education, as the reflective writing practices used frequently in the curriculum may not be effective on their own without proper instruction.

***SRL and writing self-efficacy.*** SRL impacts writing ability, but it also impacts writing self-efficacy. Some theorists believe SRL is a metacognitive process, but also one that requires learners to possess enough motivation to initiate and sustain their engagement (Bernacki et al., 2014). Within the SRL process, motivation influences behaviour, and motivation in turn will be influenced by the consequences of behaviour, products of the monitoring process, or past

motivation. Learners have an initial sense of their capability to perform a task (i.e. self-efficacy), and depending on whether or not they were successful in completing the task based on feedback, their self-efficacy will either increase or decrease in future attempts of a similar task (Bernacki et al., 2014). Self-efficacy therefore changes over the course of learning a task.

Studies have shown that self-efficacy has been linked to high SRL strategy use (such as help-seeking behaviour), performance, and learning (Bernacki et al., 2014). This is not surprising, as students' beliefs of their self-regulation has been identified as one of the components of writing self-efficacy (Bruning et al., 2013).

**Categorizing self-regulated learning strategies.** Zimmerman (1989) states that in order for students to be self-regulated, they must use specified strategies in their learning process to achieve academic goals on the basis of self-efficacy perceptions. Based on this definition, one way to evaluate SRL in students is by identifying the strategies they use that allow them to be active participants in their own learning. From a social-cognitive perspective, these strategies can be organized into categories, including self-evaluation, organizing and transforming, environmental structuring, rehearsing and memorizing, seeking social assistance, reviewing records, and nonstrategic (Purdie & Hattie, 1996; Zimmerman, 1989). These categories can be broken down further into subcategories, which are outlined in Table 1.

Table 1

*Categories and Subcategories of SRL from Purdie and Hattie (1996) and Zimmerman (1989)*

<b>Categories</b>	<b>Subcategories</b>
<b>Self-evaluation</b>	Checking the quality of work or effort Using other sources (e.g., people, computers) to check work Testing the extent of knowledge or ability to perform a task

**Organizing and Transforming**

Summarizing; listing important points; making notes while reading

Writing outlines, drafts; mental planning of a task, similar to drafting

Highlighting, underlining, marking the important parts or main ideas

Organizing files, notes, etc.; writing neat or final copies of work

Goal setting and planning

Seeking information

Keeping records

**Environmental Structuring**

Physical environment – select or arrange the physical setting to make learning easier

Self-environment – perform a particular personal behaviour so that learning is improved

Self-consequences

**Rehearsing and Memorizing**

Memorizing

Doing practice exercises to improve skill development or understanding

**Seeking Social Assistance**

Peer assistance

Teacher assistance

Adult assistance (includes out-of-school tutors and all unidentified people)

**Reviewing Records**

Reviewing notes

Reviewing tests or other completed work

Reviewing textbooks

**Nonstrategic**

Using willpower

Cheating

Statements indicating learning behaviour that is initiated by other people such as teachers or parents

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Each strategy described by Zimmerman (1989) can be superimposed onto Bandura's (1986) Triadic Analysis of SRL.

Personal self-regulation strategies would encompass the self-evaluation category, which contains strategies of student-initiated evaluations of quality or understanding of work, or the effort in relation to the task demands.

Environmental self-regulation would include the environmental structuring category, which consists of strategies where students rearrange and organize their physical environment to best suit their learning needs.

Behavioural self-regulation account for the majority of the strategies listed. It would include the organizing and transforming strategies, where students engage in the rearrangement of learning material to improve their learning, as well as the rehearsing and memorizing category where students memorize information, often through practice. In addition, the seeking social assistance category would be included in behavioural self-regulation and consists of strategies where students seek out help from others. This may seem similar to the strategy that appears in Table 1 under self-evaluation for seeking help from others to check work, but this category is much broader and includes more help seeking behaviour, particularly when a student does not understand something about the learned material. Finally, the reviewing records category involves SRL strategies that hinge on students reviewing or revising work, whether it be from their notes, from a text, or other course material or evaluations.

Then there are the non-strategic strategies, that oppose the social-cognitive idea that learning is an external process influenced by the environment. Nonstrategic strategies are rooted

in persistence and a source of “inner energy” that requires no input from the environment (Zimmerman, 1989).

**Medical students’ self-regulated learning.** There is a heavy focus on life-long learning in medical education. It is important as a physician to keep on top of the newest medical advancements and treatment options to ensure their patients are receiving the best care possible. SRL is therefore an important skill for physicians to possess (Alegria, Boscardin, Popcelet, Mayfield, & Wamsley, 2014; Cho, Marjadi, Langendyk, & Hu, 2017). Many studies have focused on SRL in medical students, reporting that high SRL levels are linked with higher academic achievement, more success in clinical skills, and better mental health outcomes than those showing low SRL levels (Cho et al., 2017). More specifically, SRL is positively correlated with Objective Structured Clinical Examination (OSCE) scores (Turan & Konan, 2012), diagnostic skill (Sobral, 2000), and success in cannulation (inserting a thin tube into a vein or body cavity) (Cleary & Sanders, 2011). SRL was also found to be negatively correlated with procrastination and positively correlated with mastery goal structures, two of which are linked to academic success (Artino et al., 2012; Cho et al., 2017). One study of 248 second-year medical students reported that low-performing students reported lower task value and self-efficacy beliefs (two components of SRL) when compared to their high-performing counterparts (Artino, Hemmer, & Duming, 2011).

However, it cannot be assumed that medical students already possess the skills to self-regulate, or that students will adapt their learning strategies between the preclinical and clinical stages of their education (Cho et al., 2017). A survey of 949 first- and third-year medical students reports that the levels of most SRL skills do not differ between the two groups of students, indicating the curriculum does not leave much room to develop and utilize these skills



(Lucieer, Jonker, Visscher, Rikers, & Themmen, 2015). The same study goes on to report that effort, reflection, and monitoring, all sub-processes of SRL, explain a portion of variance in academic performance in medical school. The claim that medical schools are not properly developing SRL skills is supported by another study that followed a cohort of medical students over two years of medical school and found that while motivation increased, SRL use decreased (Kim & Jang, 2015).

What obstacles limit medical students' ability to develop their SRL skills? A study by Jouhari, Haghani, and Changiz (2015) reports that family, peers, instructors, educational environment, and students' personal characteristics are the factors affecting SRL in medical students. Students identified hopelessness, stress, anxiety, and lack of motivation as barriers to SRL strategy use. These factors affecting SRL and barriers to SRL strategy use are important to consider when implementing medical school curricula, as they can help identify how to improve SRL development for each student on an individual basis.

### **Attitudes**

Attitudes towards writing has been defined as an effective regulation that causes writers to experience writing as a happy or unhappy process (Graham, Berninger, & Fan, 2007). Like writing self-efficacy, attitudes towards writing are reported to be a stable construct, but can be slightly developed with proper interventions, however it is less clear-cut as to what interventions work best (García-Sánchez & de Caso-Fuertes, 2005).

**Attitudes and writing competence.** Internal factors are key in demonstrating competent writing (Garrett & Moltzen, 2011; Mateos et al., 2010; Mavrogenes & Bezruczko, 1993; Nourinezhad, Kargar, & Rostampour, 2015; Sanders-Reio et al., 2014). Expectations, maturity, motivation, and self-confidence have all been identified in early literature as internal factors that

influence writing ability (Mavrogenes & Bezruczko, 1993). Students' motivation to write comes from their imagination, dreams, fantasies, personal experiences, thoughts, feelings, and emotions (Garrett & Moltzen, 2011). There is a relationship between motivation (one's willingness to learn) and language learning strategies (a learner's conscious steps and behaviours towards enhancing acquisition) with writing competence (Nourinezhad et al., 2015).

Sanders-Reio et al. (2014) also outlined four beliefs that are correlated with writing competence: Transaction Beliefs, Transmission Beliefs, Audience Orientation, and Recursive Process. Transaction and transmission beliefs are important to consider when examining students' writing competence. Writers with high *transaction beliefs* are emotionally invested in the writing, and see it as a means of deepening their understanding of a topic, whereas writers with high *Transmission beliefs* view writing as a means of reporting what authorities think (Sanders-Reio et al., 2014). Students with high Transaction beliefs scored significantly higher for their written work than students with high Transmission beliefs (Mateos et al., 2010).

*Audience orientation* is the belief that reflects the concern for the needs and interests of the reader, and has been linked to better writing competence because students are able to interpret their writing from a readers' point of view (Sanders-Reio et al., 2014). *Recursive process* is a belief that places importance on rethinking and revising at every step in the writing process. This belief is linked with higher writing competence particularly in larger writing assignments, such as dissertations and articles for publication (Sanders-Reio et al., 2014).

**Medical students' attitudes towards writing.** Studies indicate that students are receptive to changes in the curriculum that would incorporate reflective writing (Chen & Forbes, 2014) and believe that arts-based teaching has a place in medical education (De la Croix, Rose, Wildig, & Willson, 2011; McKinlay, Glenn, Gallagher, & McBain, 2017). Medical students

report that narrative writing in medicine is counter-culture, and misunderstood. They see a link between writing and future success as a physician (Arntfield et al., 2013). Students reportedly value creative writing workshops, find them helpful and enjoyable, and wish for more creative arts opportunities to exist within the medical curriculum (McKinlay et al., 2017).

Students indicate that they find value in reflective writing exercises and it helps to contextualize their learning (Borgstrom, Morris, Wood, Cohn, & Barclay, 2016). They also believe that training in narrative medicine helps prepare them for the core competencies for graduation and the CanMEDS requirements for the roles of the communicator, the collaborator, and the professional (Arntfield, et al., 2013). They believe that reflective writing has a connection to their own personal development, allows them to learn the limits of their knowledge, confidence, and comfort, and is a rewarding experience (Borgstrom, et al., 2016). Fernandez et al. (2014) found that the majority of the students found a reflective writing journal beneficial to their clinical practice. After using reflective writing for an extended period of time, these students found it to be a useful tool of revision to extend on their clinical practices, as well as improving their decision-making process.

There has also been evidence that medical students may not find writing practices in medical education the most ideal setting for expressing their inner thoughts and experiences (Borgstrom et al., 2016; Vivekananda-Schmidt et al., 2011; Walker, 2015). Fazel and Aghoamolaie (2011) reported an overall low attitude towards communication in medical education, with male medical students showing more negative attitudes than their female counterparts. There are students that question the practicality of reflective writing in medicine, don't appreciate having to write long essays about clinical encounters, and find their interactions with the patients worsen due to the daunting write-up after the fact (Borgstrom et al, 2016).

Some medical students indicated that privacy became an issue in reflective writing exercises in medical school (Vivekananda-Schmidt et al., 2011). They felt very conscious of their personal feelings being put on display, and they reported not including some experiences in their reflection because they were worried that others will read it. Students also felt forced to write reflective passages, and found they were making experiences up to meet a set word count, leading to dissatisfaction and disengagement from the writing, defeating the purpose of the exercise altogether (Vivekananda-Schmidt et al., 2011). Even students who reported seeing the value in reflective writing find it to be a time-consuming process, especially after performing tasks as mentally and physically taxing as those experienced on clinical rounds (Fernandez et al., 2014).

### **Summary**

Overall, writing in post-secondary education proves to be a very complex topic that cannot be treated the same from one discipline to the next. Despite issues surrounding the implementation of writing in medicine and medical education, there is much evidence surrounding the importance of developing this skill. Reflective writing practices prove to be, for the most part, a valuable way for students to develop clinical skills, such as communication and empathy. It is understood that writing self-efficacy, SRL, and attitudes towards writing play a large role in writing competence and student achievement.

However, there is little recent literature that examines medical students' writing self-efficacy and its link to SRL and attitudes towards writing. Addressing this gap is important because all three covariates are linked to writing competence, which LCME requires from graduating students. In the existing literature on the topic, very little is given from the point of view of medical students. They have first-hand experience with writing practices in medical

school and are the only population who can comment on the effectiveness of these practices from a user perspective. Research involving medical students is therefore an important component to evaluating where the medical education curricula may fall short for some of its students. If research targets medical students' concerns regarding writing, there could be a direct benefit to the students through resulting curricular changes. We decided to address this gap in the literature ourselves, using a survey of medical students' writing self-efficacy, SRL strategy use, and attitudes towards writing.

### **Chapter 3: Methodology**

This study explored the perspective of medical students, gauging their perceptions of their writing competence, SRL strategy use, and attitudes towards writing. Using a survey is an appropriate approach to addressing this question because it lends itself well to the concept of self-report.

This chapter provides an overview of the survey method, survey design, sample population, and recruitment methods, as well as the data collection, preparation, and analyses. Ethical considerations are included at the end of this chapter.

#### **Survey Method**

Surveys involve collecting relatively small amounts of data from a large sample, providing a snapshot of how things are at a specific moment in time (Kelley, Clark, Brown, & Sitzia, 2003). Survey designs generally do not require controlled conditions, or the manipulation of variables, but instead focus on standardized data collection using a questionnaire or interview protocol.

A common difficulty experienced by researchers conducting surveys is the response rate. Generally, a good response rate that reduces concern for bias and generalizability is above 50%, but it is highly dependent on how hard the respondents are to reach (Brown, 2011). The higher the response rate, the more likely the results of a survey are an accurate and reliable representation of the population. Researchers aim to maximize response rate by creating well-designed surveys.

Surveys have been used to collect data specific to writing competence, writing in medical education, and SRL. These concepts are easily quantified by using the survey method as they are often subjective and require some level of self-report. For example, surveys have been used to

identify factors that influence students' writing ability in research involving writing competence (Mahfouz, 2010; Maringe & Jenkins, 2015; Palmquist & Young, 1992; Sanders-Reio et al., 2014). In research concerning writing in medical education, the survey has been a useful tool in collecting information about students' perceptions of their writing competence and resources available to them and allowed for the identification of key areas that needed work in the medical education system (Ariail et al., 2013; Borgstrom et al., 2016; Langley & Brown, 2010). In SRL research, surveys have been used in the form of SRL scales to measure students' ability to self-regulate their learning processes (Cho et al., 2017; Kassab, Al-Shafei, Salem, & Otoom, 2015; Kim & Jang, 2015; Lucieer et al. 2016; Lumma-Sellenthin, 2012; Purdie & Hattie, 1996).

There are a number of ways to administer a survey. Online surveying is an increasingly popular method of data collection, as it eases the workload of the researchers, makes it easier to reach participants, speeds up data processing, and lowers costs (Burns & Kho, 2015; Zhang, Kuchinke, Woud, Velten, & Margraf, 2017). Over half of the studies noted in this chapter that used a survey method administered the surveys online. Because of the increasing popularity of this approach, the advantages of an online survey, and the fit with the research question we chose to administer our survey online.

SurveyMonkey was the online surveying tool of choice as it allowed us to create and distribute the survey and collate the data. SurveyMonkey is a reliable and secure platform based in the U.S., and meets the ethical requirements of the Tri-Council Policy Statement 2 (TCPS2).

Though there are obvious benefits of administering surveys online, there are also shortcomings to this method of surveying, such as reaching only those with access to online portals, and low response rates in comparison to surveys administered in-person (Duncan, 2008). Over the years, surveys have changed from being an obligation to a choice or convenience

(Colbert, Diaz-Guzman, Myers, & Arroliga, 2013; Klabunde et al., 2012; Rindfuss, Choe, Tsuya, Noriko, Bumpass, & Tamaki, 2015).

We decided to supplement our online survey with hardcopy surveys. This way, we accounted for the low response rate associated with online surveys, while maintaining the convenience of the survey as an approach to data collection.

### **Survey Design**

A survey (see Appendix C1) was created and distributed to 320 medical students attending an Atlantic Canadian university. The survey aimed to test the hypotheses that overall writing self-efficacy in medical students was low, and that writing self-efficacy, SRL strategy use, and attitudes towards writing were positively correlated. The survey was made up of 23 main questions, which totaled to 61 items across 5 sections of the survey instrument. These sections were developed using themes that emerged from the literature (see below) and the experience of the research team. We used a mainly 5-point Likert-scale format standardized by Bandura and Schunk (1981).

Pilot studies are used to ensure a survey's success (Brown, 2011). Before administrating the survey to the entire sample, it was tested on a sample group of 10 participants to evaluate the structure, organization and understandability of the questions. The feedback from the pilot participants was used to revise the phrasing and formatting of some questions. Errors with the flow of the survey, such as broken links, were also corrected.

To participate in the survey, participants entered the link provided into an internet browser, directing them to the first page of the survey with the consent form (Appendix C2). This form explained the purpose of the study, their role in the study as participants, and gave the option to accept or decline participating in the study. If a student agreed to participate, they were



directed to the next page, and the beginning of the survey. We estimated the survey would take 10-15 minutes for students to complete.

The hardcopy version of the survey maintained the same questions as the online survey, but the format was modified so it made sense on paper. For example, instead of drop-down menus for certain Likert-scale formatted questions, each option was listed, and participants had to check off their response.

### **Survey Development**

**Demographic information.** The first section of the survey gathered demographic information, as well as the students' educational background, experience with writing, and language fluency. There were 12 questions in total, and items were based around factors that past literature suggested impacted writing ability, such as language fluency (Mahfouz, 2010), writing instruction (Blake et al., 2016; Harris et al., 2013), and feedback (Christophel, Gaschier, & Schnotz, 2014).

**Writing self-efficacy scale.** The second section of the survey aimed to gather information about medical students' writing self-efficacy, addressing the first objective of this research. We developed a writing self-efficacy scale for this section by using qualities of competent writers that were outlined in past literature (Sanders-Reio et al., 2014) and adapted certain questions from Graham and colleagues (1993). There were 6 main questions, with one question divided into 8 items. The scale used by Graham and colleagues (1993) is presented in Appendix D. We did this to determine how medical students perceived their writing ability specifically in a medical education setting. For example, "When my class is asked to write a report, mine is the best" (Graham et al., 1993) was adapted into "How would you rank your writing competence as a medical student when compared to your peers?", "When writing a paper

I find it easy to make all the changes I need to make” (Graham et al., 1993) was adapted into “I use appropriate strategies to fix problems with my writing.”, and “When writing a paper it is easy for me to get ideas” (Graham et al., 1993) was adapted into “I write good reflection papers for class, reflecting on my own thoughts and experiences.”. Using the context of medical education in our scale of writing self-efficacy ensured we were gaining students’ writing self-efficacy beliefs about writing specifically in medical education and not just writing in general.

**SRL strategy use scale.** The third section measured students’ use of SRL strategies with an adapted version of the SRL strategy categories listed by Purdie and Hattie (1996), originally developed by Zimmerman (1989). This scale was modified to consist of 24 items, 21 of which presented a strategy that is used by self-regulated learners, and 3 of which were non-SRL strategies included for comparative purposes. Students indicated on a 5-point Likert scale how often they used each individual strategy. This measure of SRL using the different strategies of SRL was chosen over other methods of quantifying SRL (e.g. classroom interaction, use of instructional media) because it was the most appropriate for the self-report format of the survey.

**Attitudes towards writing scale.** The fourth section presented a scale developed by the research team to measure students’ attitude towards writing in medical education. We developed the questions from this section using our knowledge of past research in this area (Rosário et al., 2016; Troia, Harbaugh, Shankland, Wolbers, & Lawrence, 2012) and instructional experience of team members. There were 3 main questions, and one question was divided into 9 items.

**Open-ended question.** The fifth section consisted of one open-ended question where students could share any additional comments they may have had. The purpose of open-ended questions in a questionnaire survey is to supplement survey data with enriched accounts from participants, while providing the opportunity to raise topics that we as researchers may have left

out (Gilles, Mayer, Courvoisier, & Peytremann-Bridevaux, 2017). This question intended to collect students' thoughts or commentary on any of the topics covered in the survey, or any topics that we may have missed. This opened the floor for unfiltered and unbiased commentary from medical students, and allowed them to direct the conversation on writing in medicine.

### **Study Population**

To ensure our sample was representative of the population, we used purposive sampling. Purposive sampling is a non-random strategy used to select participants based on certain qualities and characteristics they possess (Etikan, Mussa, & Alkassim, 2016). This type of sampling was chosen because we knew exactly what participants would provide the information we needed in this study and who were knowledgeable on the topic: undergraduate medical students.

Those recruited for this study were students enrolled in an Atlantic Canadian school of medicine. This university was chosen because no published literature was identified on the state of writing in medicine at this university. This medical school does not have a medicine-specific writing center or writing resources for their undergraduate students, but rather a centralized writing center for all degree-types. As a result, their writing experience in medicine would most likely stem from the medical education curriculum. This is also an English-speaking medical program.

Students from all four years of medical school were recruited. Each year, 80 students are admitted with a sample population of 320 students spanning four years. There were no exclusion criteria for this study.

The present study used a probabilistic research design, and therefore, sample size was important. Sample size is in line with a certain degree of reliability in survey research, and

should be taken into consideration. Using the formula in Figure 1 (see Appendix D), sample size was calculated. Using a margin of error of 5% and a confidence level of 95%, and a population of 320, the optimal sample size for this survey was 175 respondents.

## **Recruitment**

The Undergraduate Medical Education Office (UGME) agreed to distribute a letter of invitation to participate in our web-based survey to all undergraduate medical students at an Atlantic Canadian University via e-mail on our behalf (Appendix C2). The email introduced the purpose of the study, explained the role of the participant, and noted that further details would be provided in-person during information sessions on a set date after class ended. It also included the e-mail address through which they could contact us for the survey link if they wished to participate. Not including the link in the e-mail ensured the students knew that the research was not affiliated with UGME and their participation in the survey would in no way affect their grades.

The emails were sent out prior to the classroom information sessions, and a follow-up e-mail was sent out after the information sessions. Sending e-mails both before and after survey administration has been shown to boost response rates (Brown, 2011; Keusch, 2012). Fourth year students were recruited solely in-person during information sessions. This is because the anticipated timing of the recruitment e-mail for fourth year students would have taken place during major examinations, and UGME did not want to distract students with non-essential e-mails. E-mails were sent out to each year separately, and data collection took place over the span of five months.

First-, second-, and fourth-year students were visited at the conclusion of a regularly scheduled class time for a brief information session about the study. Third-year medical students

were not recruited in-person, as they did not have any mandatory classes scheduled for the year while clinical rotations were ongoing. The schedule of our data collection is shown in Table 2.

Table 2

*Schedule for Data Collection*

	<b>Recruitment e-mail</b>	<b>Mandatory class</b>	<b>Reminder e-mail</b>
<b>Year 1</b>	November 23, 2017	November 24, 2016	December 15, 2017
<b>Year 2</b>	January 12, 2017	April 12, 2017	January 26, 2017
<b>Year 3</b>	November 23, 2017	N/A	December 15, 2017
<b>Year 4</b>	N/A	March 27, 2017	N/A

Academic Program Assistants were consulted to provide contact information of medical faculty involved with teaching mandatory classes. Providing students with information about the study after a class that required mandatory attendance was more likely to inform a maximum number of students about the study. Meeting after class also reduced the risk of coercion associated with visiting during class time.

During these information sessions, the purpose of the study was introduced, questions were addressed, and medical student participation in the survey was requested. There was a brief explanation as to how the survey worked, and the link to the survey on SurveyMonkey.com was handed out to the students (SurveyMonkey, 2017). Students were made aware that their participation was completely voluntary and that their responses were anonymous. After the explanation was given and the survey was made available to the students, the primary investigator exited the classroom to reduce the risk of coercion.

For those that preferred to complete a hardcopy version, paper copies of the survey and the informed consent form were printed out and left at the front of the room for them to take as

they left. The students were asked to return the hardcopy surveys and detached consent forms to us at our office at the university.

Incentive to complete this study was provided in the form of a chance to win one of ten \$20 Tim Horton's gift cards. This was mentioned in the recruitment e-mail as well as during the information sessions. The last section of the survey is where students could opt into the draw if they wished by clicking a link to a separate survey where they would leave their e-mail. This question was optional, and the students could skip it if they did not wish to enter the draw.

### **Data Preparation**

Data collected in SurveyMonkey were imported directly into Statistical Package for Social Sciences (SPSS) for cleaning and analysis. Each participant was represented by only a number and no identifying information; each data set from a participant had its own row in SPSS, with each column representing a different item on the survey. Responses to the open-ended question were copied into a Word file and organized into a table for comparative purposes.

Though we received no hard-copy surveys, we would have entered these responses into SurveyMonkey ourselves and then imported the data into SPSS in the same format as the online surveys.

**Coding.** The Likert-scale formatted responses were coded from 1 to 5, representing the Likert scale format of the survey questions from strongly disagree to strongly agree. Certain items had to be reverse coded due to the way questions were worded and how they fit with the other questions of the scales. For example, the question "How would you rate your overall writing ability", "Excellent" was originally coded as a 1.00, "Very Good" as 2.00, "Good" as 3.00, "Fair" as 4.00, and "Poor" as 5.00. In these cases, all 1.00 responses were changed to 5.00, all 2.00 responses were changed to 4.00, 3.00 responses stayed the same, 4.00 responses became

2.00, and 5.00 responses became 1.00. Reverse coding was performed on 21 items of the survey. This was to ensure that the higher numerical scores reflected more positive attitudes, higher self-efficacy beliefs, and more positive attitudes towards writing.

The demographic information was also coded numerically to perform a demographic analysis.

**Missing data.** Data were entered automatically by SurveyMonkey as participants completed the survey. If, for some reason, there were survey responses that were corrupt or inaccurate, SurveyMonkey provided the option for the researcher to go through the data and delete individual responses. If respondents entered the survey but did not answer any questions, SurveyMonkey also allowed for the deletion of all responses from a participant.

Missing values were coded to ensure they did not alter statistical tests. When compiling the scales for writing competence, SRL, and attitudes towards writing, the mean of the scale was entered for respondents with an acceptable amount of missing data, and those with too much missing data (over 50%) were left out of the scale.

**Scales.** We developed the writing self-efficacy, SRL strategy use, and attitudes towards writing scales because there were no pre-existing validated scales in the literature that examined these constructs in a medical education context. We considered this to be important since discipline-specificity of writing has been a very prevalent topic in the literature (Bentley & Brown, 2014; Buzzi et al., 2012; Hunter & Tse, 2013; Hyland, 2013; Mitchell et al., 2017; Staples et al., 2016). These scales were created first by running Cronbach's alpha on each item of the scale, ensuring they were measuring a similar concept. A Cronbach's alpha coefficient of 0.70 was used as an acceptable level of internal consistency in this study, as this value is used in most social science research (Santos, 1999). If the scale produced an alpha value lower than

0.70, we determined which item of the scale yielded the lowest value, removed the item from the scale, and ran the Cronbach's analysis again until the alpha coefficient was above the accepted value. The mean of all the scale items was calculated, and each individual data set received a mean score ranging from 1 to 5 for that scale.

After running a Cronbach's alpha analysis on the writing self-efficacy scale, there were three items excluded from the scale. These items were "I successfully conduct library research to locate information to support my ideas", "I have difficulty communicating my ideas in writing", and "I write good journal articles". The presence of these three scale items decreased Cronbach's alpha to below the accepted level, and therefore did not reliably measure writing self-efficacy. We were therefore justified in removing the items from the scale for analysis. After removing these items, eight scale items remained (see Appendix C1).

Three items in the SRL strategy use scale were excluded because they do not reflect strategies directly related to SRL. The item, "I force myself to study until I have a good understanding of the learning objectives" may be linked to willpower. The item "I refer to others' work for ideas" may be linked to cheating. The item, "I just do what the instructor expects of me" is behaviour initiated by someone else. The remaining 21 items were organized into six subscales for analysis using the categories outlined in Zimmerman (1989) and Purdie and Hattie (1996). These categories were self-evaluation, organizing and transforming, environmental structuring, rehearsing and memorizing, seeking social assistance, and reviewing records.

The attitudes towards writing scale was not internally consistent, and therefore could not be used as a cohesive scale. However, we were able to analyze the items of the scale individually with the other scales.



## **Variables**

Eleven of the 22 questions were Likert-scale format; therefore, most of the variables were simply coded from one to five, one being the lowest and five being the highest in each context to allow for the cross-examination of variables.

The independent variables of this study were year of undergraduate education, undergraduate/graduate degree type, amount of writing instruction and feedback received prior to and during medical education, number of fluent languages, number of publications prior to and during medical education, number of gap years, and gender. This information was collected through non-Likert scale formatted questions.

The dependent variables of this study were the three scales: perceived writing competence, SRL strategy use (and its subscale), and attitudes towards writing in medical education. This information was collected through Likert-scale formatted questions.

## **Analyses**

Descriptive statistics in the form of means, standard deviations, and frequencies were used to describe the sample, create the scales, report how medical students used SRL strategies, and test our first hypothesis of how highly medical students perceive their writing competence.

Inferential statistics were also performed to test our second hypothesis about the correlation between perceived writing competence, SRL strategy use, and attitudes towards writing. Differences between groups of students on their writing competence, SRL, and attitudes scores were analyzed using t-tests. Multivariate tests including one-way ANOVAs were used when comparing more than two grouping variables, such as the year of undergraduate medicine or degree type. Regression analyses were used to determine how much variance in each scale was accounted for by other variables.

The responses to open-ended questions were coded thematically using simple descriptive qualitative analysis and constant comparison. The constant comparison method is used to create theories, not test them (Coghlan & Filo, 2013), which is a good fit for this research, as there is very little theory discussing writing self-efficacy, SRL, and attitudes towards writing in the medical context. All responses were read and re-read to identify emerging themes.

### **Ethical Considerations**

We followed the guidelines set out by the TCPS2 to ensure the three core principles of this policy (Respect for Persons, Concern for Welfare, and Justice) were upheld (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, & Social Sciences and Humanities Research Council of Canada, 2014, p.6).

Ethics approval was obtained from the Interdisciplinary Committee on Ethics in Human Research (ICEHR) at the university to protect the rights and welfare of the human subjects involved (see Appendix E).

There were minimal risks associated with participating in this study. Other than a few demographic questions, no personally identifying or overly sensitive data were collected, and the data were accessible to the researchers assigned to this study only.

Students consented to participating in the study after reading the informed consent form (see Appendix C1) on the first page of the survey and clicking (online) or checking (hardcopy) “I agree to participate”. The form included all relevant information pertaining to the study so that the participants could make an informed decision on whether they wished to participate.

There were no exclusion criteria for this study beyond the requirement of being an undergraduate medical student at the university.

The data collected for this study did not have any identifiers and is classified as anonymous information (Canadian Institutes of Health Research et al., 2014, p.59). Data will be used for research purposes only.

To establish a trusting relationship between the participants and the researcher, the students were informed that their participation in the study was completely voluntary, would in no way affect their grades in any coursework, and their data remained anonymous in the research. Students were informed that there was no option to withdraw their data after they clicked to submit their data, as it would not be possible to differentiate their data from that of other participants. If the survey was exited before they pressed submit, the responses were not saved, and therefore no data from that participant was collected. Students were also reminded that they were not obligated to answer any questions that caused them unease or discomfort.

To maintain participant confidentiality, a member of the Health Research Unit conducted the draw for the gift cards using the names entered by the participants in a separate form linked to the survey. My co-supervisors and I were the only people with access to the data collected from the surveys from that point onward.

All electronic data were stored on a password protected computer. All hardcopy data would have been stored in a locked filing cabinet in an office on campus; however, no hardcopy surveys were returned by the participants. We did everything we could to ensure data security, keeping in mind that there is a potential risk that the online platform (SurveyMonkey) may be hacked by an external agent.

Participant anonymity was maintained in several ways: Participants were assigned random numerical values by SurveyMonkey. No participant names were linked to the survey data and therefore, responses and comments could not be linked to individual participants. The e-

mail address for the draw was the only identifying information optionally provided by participants. This information was kept separate from survey responses.

We also arranged for an administrative assistant to accept and store any hardcopy surveys passed in by the students. None were collected.

**Conflicts of interest.** There were no conflicts of interest involved with this study. The researchers involved with this study had no involvement with the medical education curriculum or the students.

## Chapter 4: Results

The purpose of this study was to quantify students' writing self-efficacy, their use of SRL strategies, and their attitudes towards writing in medical education. Through our statistical analyses, we determined if these three items were correlated. We also aimed to measure students' experience with writing, and identify any issues within the medical education curriculum impeding students' ability to write.

### Demographics

After recruiting from all four years of undergraduate medical education, 53 students (16.6%) completed the survey. Since we were unable to visit third year students in class, recruitment relied solely on the mass email from UGME. However, e-mailing proved to be unsuccessful at recruiting participants, and as a result, third year students were not represented in this sample. Demographic information about the participants is presented in Table 3.

Table 3

*Participant Demographic Information (n = 53)*

Variable	N (%)
<i>Year of undergraduate medical education</i>	
First	15 (28.3)
Second	19 (35.9)
Third	0
Fourth	19 (35.9)
<i>Gender</i>	
Male	23 (43.4)
Female	29 (54.7)
Prefer not to answer	1 (1.9)
<i>Undergraduate degree type</i>	
Arts and humanities	1 (1.9)
Education	1 (1.9)
Engineering	1 (1.9)
Health sciences	1 (1.9)
Kinesiology	7 (13.2)

Music	2 (3.8)
Nursing	4 (7.6)
Pharmacy	3 (5.7)
Science	37 (69.8)
Other	2 (3.8)
<i>Graduate degree type</i>	
Business	1 (6.6)
Kinesiology	3 (20.0)
Music	1 (6.6)
Public health	3 (20.0)
Science	5 (33.3)
Other	2 (13.3)
<i>Years passed between programs</i>	
No gap	27 (50.9)
1	12 (22.6)
2-3	11 (20.8)
4-5	2 (3.8)
5+	1 (1.9)
<i>Number of publications prior to medical education</i>	
0	26 (49.1)
1-2	18 (34.0)
3-5	7 (13.2)
5+	2 (3.8)
<i>Number of publications since beginning medical education</i>	
0	30 (56.6)
1-2	19 (35.8)
3-5	3 (5.7)
5+	1 (1.9)
<i>Number of fluent languages</i>	
1	5 (9.4)
2	38 (71.7)
3	10 (18.9)

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Students came from varying educational backgrounds, with a focus on science (69.81%) and health care (28.3%) degrees as opposed to non-science degrees (9.43%). Of the degrees in science, 18 students (48.6%) completed their degrees in biochemistry. Of the students with

experience in any field other than science, their arts backgrounds included music (3.8%), education (3.8%), and French (1.9%).

Students also had different experiences with writing instruction and feedback in their undergraduate/graduate education. The percent frequencies are displayed in Table 4.

Table 4

*Students' History with Writing Instruction and Feedback*

Item	Mean	Percent Frequency				
		Never	Rarely	Occasionally	A Moderate Amount	A Great Deal
<b>Have you received specific writing instruction during your undergraduate/graduate education?</b>	3.23 (0.93)	1.9	20.8	37.7	32.1	7.5
<b>Did you receive any formal feedback on your writing from your instructors during your undergraduate/graduate education?</b>	3.64 (0.81)	0	7.5	34.0	45.3	13.2

### Medical Students' Writing Self-Efficacy

We were able to calculate the mean writing self-efficacy scores of all 53 students. Most students had writing self-efficacy scores over the midpoint of 3.00 (88.68%), two had exactly 3.00 (3.77%), and four students yielded a score below 3.00 (7.55%). The mean writing self-efficacy score was 3.80 (SD = 0.60).

As shown in Table 5, medical students scored themselves relatively high on each item of the writing self-efficacy scale. Students ranked two areas as particularly strong: first was the use of appropriate vocabulary and word forms to effectively communicate with the reader (84.3% “often” or “almost always”); and second was revising their writing to improve organization and development of ideas (78.4% “often” or “almost always”).

Table 5

*Mean Writing Self-Efficacy Scores of Medical Students for Each Scale Item*

Scale item	Mean	Percent Frequency					Missing Data
		Never (Almost Never)	Seldom	Sometimes	Often	Always (Almost Always)	
I use appropriate vocabulary and word forms to effectively communicate with a reader.	4.02 (0.97)	0	2	13.7	64.7	19.6	0
I revise my own writing to improve organization and development of ideas.	4.04 (0.80)	0	3.9	17.6	49	29.4	0
I identify problems in my writing and see what should be improved.	3.74 (0.99)	2	7.8	27.5	37.5	23.5	3.8
I use appropriate strategies to fix problems with my writing.	3.48 (1.07)	3.9	11.8	35.3	27.5	19.6	3.8
I write good reflection papers for class; reflecting on my own thoughts and experiences.	3.47 (0.97)	2	13.7	33.3	37.3	13.7	0
		Poor	Fair	Good	Very Good	Excellent	Missing



<b>How would you rate your overall writing ability?</b>	3.88 (0.86)	0	5.9	25.5	43.1	25.5	0
<b>How would you describe your ability as a medical student to communicate in writing?</b>	3.74 (0.69)	0	2	33.3	51	11.8	3.8
<b>How would you rank your writing competence as a medical student when compared to your peers?</b>	3.71 (0.88)	0	5.9	39.2	33.3	21.6	0

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*Note:* Standard deviations are displayed in parentheses below their respective means.

It is interesting to note that none of the respondents believed their writing ability to be “poor”, and only 5.9% ranked their writing as “fair” (Table 4.2). The remaining students (94.1%) perceived their writing as “good”, “very good”, or “excellent.”

Receiving specific writing instruction in undergraduate/graduate education had no significant correlation with writing self-efficacy ( $r = .23, p > 0.05$ ), nor did receiving formal feedback on written compositions in undergraduate/graduate education ( $r = .21, p > 0.05$ ).

The amount of publications produced by students prior to and during their medical education was not correlated with writing self-efficacy ( $r = .15, p > 0.05$ ;  $r = .010, p > 0.05$ ).

Unsurprisingly, students that ranked themselves high on the English language fluency scale correlated significantly with writing self-efficacy,  $r = .36, p < .01$ . The number of languages spoken by students was correlated with writing self-efficacy,  $r = .30, p < .01$ . However, the main effect of number of fluent languages was not significant,  $F(2, 52) = 2.88, p > 0.05$ . Students who were fluent in one, two, or three languages, did not differ on their writing self-efficacy (see Table 6 for means).

Table 6

*One-Way ANOVA on Demographics and Writing Self-Efficacy*

Variable	Group	N	Writing Competence		ANOVA	
			<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>
Undergrad year	First	15	3.61	.63	1.05	.36
	Second	19	3.85	.57		
	Fourth	19	3.91	.62		
Graduate degree	Yes	15	3.79	.37	0.0080	.93
	No	38	3.81	.68		
Gender	Male	23	3.71	.59	0.53	0.59
	Female	29	3.88	.62		
Fluent languages	One	5	3.75	.30	2.88	.065
	Two	38	3.70	.60		
	Three	10	4.20	.63		
Number of gap years	No gap	27	3.77	.60	0.54	.66
	1 year	12	3.93	.74		
	2-3 years	11	3.84	.47		
	4+ years	3	3.44	.59		

The main effects of undergraduate year, gender, and number of gap years were also not significant after performing a one-way ANOVA (see Table 4.3). Therefore, students belonging to different groups of these variables did not differ from each other on their writing self-efficacy.

Due to the small sample size for the groups of degree type, a Mann-Whitney U test was conducted and showed that there was no significant difference ( $U = 46.0$ ,  $p > 0.05$ ) between students with science-based ( $n = 49$ ) and arts-based ( $n = 4$ ) undergraduate/graduate degrees.

The three items left off the writing self-efficacy scale and their percent frequencies and means are reported in Table 7. Though they are not included in the scale, there is still meaningful

conclusions to be drawn from students' responses. The data collected from these items benefit this research and address relevant topics.

Table 7

*Means and Percent Frequencies of Writing Self-Efficacy Items*

Survey item	Mean	Percent Frequency					Missing Data
		Never (Almost Never)	Seldom	Sometimes	Often	Always (Almost Always)	
<b>I have difficulty communicating my ideas in writing.</b>	2.02 (0.80)	26.4	49.1	20.8	3.8	0	0
<b>I successfully conduct library research to locate information to support my ideas.</b>	3.92 (0.98)	0	9.4	22.6	34.0	34.0	0
<b>I write good journal articles.</b>	2.82 (1.18)	20.8	9.4	35.8	26.4	3.8	3.8

*Note:* Standard deviations are displayed in parentheses below their respective means.

### Medical Students' SRL Strategy Use

Using the scale created to measure SRL strategy use, we were able to compute the mean scores of 50 students after accounting for missing data. Though the majority of students received a mean score over 3.00 (92%), four students (8%) received a mean score of less than 3.00. The mean SRL strategy use score was 3.59 ( $SD = .47$ ), and the means for each strategy along with the means for each sub-category are presented in Table 8.

Table 8

*Mean and Percent Frequency of SRL Strategy Use of Medical Students*

Percent Frequency	
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<b>SRL strategy</b>	<b>Mean</b>	<b>Never (Almost Never)</b>	<b>Seldom</b>	<b>Sometimes</b>	<b>Often</b>	<b>Always (Almost Always)</b>	<b>Missing Data</b>
<b>Self-evaluation</b>	<b>3.57 (0.70)</b>						
I check my work after I've finished before handing it in.	4.33 (0.90)	1.9	1.9	9.4	32.1	50.9	3.8
I use other resources to check my work (e.g., other people, the internet).	3.02 (1.16)	11.3	18.9	35.8	20.8	11.3	1.9
I find ways to test myself after having learned a topic.	3.37 (0.93)	1.9	15.1	35.8	35.8	9.4	1.9
<b>Organizing and Transforming</b>	<b>3.60 (0.66)</b>						
I summarize important facts into main points while reading passages.	3.42 (0.91)	1.9	15.1	28.3	45.3	7.5	1.9
I create an outline before writing a paper.	3.33 (1.15)	5.7	17.0	34.0	22.6	18.9	1.9
I highlight important points while reading passages.	3.54 (1.04)	5.7	9.4	22.6	47.2	13.2	1.9
I organize my notes to ensure I am clear about what I have to learn for a certain topic.	3.83 (0.96)	1.9	7.5	20.8	43.4	24.5	1.9
I set goals for myself to complete tasks.	3.90 (0.91)	0.00	9.4	17.0	45.3	26.4	1.9

I seek out additional information other than what I am given about a topic I am studying.	3.54 (0.76)	0.00	5.7	41.5	37.7	9.4	5.7
I take useful notes in class.	3.62 (1.05)	5.7	7.5	18.9	47.2	15.1	5.7
<b>Environmental Structuring</b>	<b>4.00 (0.51)</b>						
While studying, I seek out an environment that optimizes my concentration.	4.32 (0.68)	0.0	0.0	11.3	41.5	41.5	5.7
I take breaks from my work when I feel tired	3.98 (0.65)	0.0	1.9	15.1	60.4	17.0	5.7
I reward myself for completing tasks for school.	3.71 (0.84)	0.0	5.7	32.1	37.7	17.0	7.5
<b>Rehearsing and Memorizing</b>	<b>3.68 (0.77)</b>						
I am able to memorize information for tests.	4.14 (0.86)	1.9	1.9	11.3	45.3	34.0	5.7
I complete practice exercises to make sure I understand certain topics.	3.58 (0.95)	1.9	11.3	24.5	43.4	13.2	5.7
<b>Seeking Social Assistance</b>	<b>2.95 (0.64)</b>						
I ask my peers questions when I do not understand a particular topic.	3.88 (0.75)	0.0	5.7	15.1	58.5	15.1	5.7
I ask my instructor questions when I do not understand a particular topic.	2.78 (0.98)	9.4	24.5	39.6	15.1	3.8	7.5

I ask others (e.g., librarian, tutors) questions when I do not understand a particular topic.	2.20 (0.95)	22.6	39.6	24.5	5.7	1.9	5.7
I review notes while studying for a test.	4.52 (0.76)	0.0	0.0	15.1	15.1	64.2	5.7
<b>Reviewing Records</b>	<b>3.58 (0.72)</b>						
I review past assignments and other past school work while studying for a test.	3.24 (1.10)	5.7	18.9	28.3	30.2	11.3	5.7
I review my textbook (if there is one) while studying for a test.	2.98 (1.15)	13.2	15.1	34.0	24.5	7.5	5.7

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*Note:* Standard deviations are displayed in parentheses below their respective means.

Some SRL strategies were used more often than others. Strategies such as checking their work before handing it in ( $M = 4.33$ ,  $SD = .90$ ), seeking environments that optimize concentration ( $M = 4.32$ ,  $SD = .68$ ), reviewing notes before a test ( $M = 4.52$ ,  $SD = .76$ ), and memorizing information for a test ( $M = 4.14$ ,  $SD = .86$ ) were the strategies used most often by the medical students. However, strategies such as reviewing the textbook while studying ( $M = 2.98$ ,  $SD = 1.15$ ) and asking others ( $M = 2.20$ ,  $SD = .95$ ) or the instructor questions when struggling with a topic ( $M = 2.77$ ,  $SD = 1.00$ ) were used the least by the medical students.

The main effects of undergraduate year, gender, and number of gap years did not have a significant impact on SRL strategy use scores after performing a one-way ANOVA (see Table 9). Therefore, students belonging to different groups of these variables did not differ from each other on their SRL strategy use.

Table 9

*One-Way ANOVA on Demographics and SRL Strategy Use*

Variable	Group	N	SRL		ANOVA	
			M	SD	F	p
Undergrad year	First	15	3.60	.36	2.05	.14
	Second	18	3.42	.54		
	Fourth	17	3.74	.45		
Graduate degree	Yes	14	3.56	.36	0.066	.80
	No	36	3.60	.56		
Gender	Male	23	3.49	.38	1.96	.17
	Female	27	3.67	.53		
Fluent languages	One	4	3.44	.34	0.38	.69
	Two	36	3.58	.49		
	Three	10	3.66	.48		
Number of gap years	No gap	25	3.52	.48	0.72	.55
	1 year	11	3.54	.54		
	2-3 years	11	3.75	.75		
	4+ years	3	3.70	.32		

A Mann-Whitney U test revealed that there was a significant difference ( $U = 4.50$ ,  $p < 0.05$ ) between students' SRL strategy use with science-based ( $n = 46$ ) versus arts-based ( $n = 4$ ) undergraduate/graduate degree types. Students with strictly science-based degrees had a mean SRL score of 3.52 ( $SD = .43$ ) whereas students with some background in the arts had a mean SRL score of 4.32 ( $SD = .24$ ).

In comparison, we ran a one-way ANOVA on the different categories of SRL strategies. Certain groups of students showed significant differences in the organizing and transforming category, and the reviewing records category.

A one-way ANOVA revealed a significant main effect of gender on utilizing organizing and transforming strategies,  $F(1,49) = 4.87, p < 0.05$ . Females ( $M = 3.78, SD = .70$ ) used organizing and transforming strategies significantly more than males ( $M = 3.39, SD = .54$ ). The means and standard deviations are reported in Table 10.

Table 10

*One-Way ANOVA on Demographics and Organizing and Transforming SRL Category*

Variable	Group	N	SRL		ANOVA	
			M	SD	F	p
Undergrad year	First	15	3.55	.47	.38	.69
	Second	18	3.53	.78		
	Fourth	17	3.71	.69		
Graduate degree	Yes	14	3.59	.44	0.0030	.96
	No	36	3.60	.73		
Gender	Male	23	3.39	.54	4.87*	.032
	Female	27	3.78	.70		
Fluent languages	One	4	3.46	.32	0.28	.76
	Two	36	3.58	.66		
	Three	10	3.73	.77		
Number of gap years	No gap	25	3.50	.70	0.62	.61
	1 year	11	3.58	.78		
	2-3 years	11	3.83	.49		
	4+ years	3	3.62	.36		

\* correlation is significant at a 0.05 level (2-tailed)

Another one-way ANOVA revealed that students of different years of undergraduate medical education differed significantly from each other in the reviewing records category,  $F(2,49) = 4.93, p < 0.05$ . After running a Tukey LSD post-hoc test, we determined that fourth year students ( $M = 3.96, SD = .54$ ) used reviewing records strategies significantly more than



second year students ( $M = 3.26$ ,  $SD = .74$ ) at the 0.01 level of significance. There was no significant difference in reviewing records between first year students ( $M = 3.53$ ,  $SD = .70$ ) and second or fourth year students. The means and standard deviations are reported in Table 11.

Table 11

*One-Way ANOVA on Demographics and Reviewing Records SRL Category*

Variable	Group	N	SRL		ANOVA	
			M	SD	F	p
Undergrad year	First	15	3.53**	.70	4.93*	.011
	Second	18	3.26	.74		
	Fourth	17	3.96**	.54		
Graduate degree	Yes	14	3.48	.69	0.41	.53
	No	36	3.62	.73		
Gender	Male	23	3.48	.72	0.86	.36
	Female	27	3.67	.71		
Fluent languages	One	4	3.50	.58	0.29	.75
	Two	36	3.55	.76		
	Three	10	3.73	.64		
Number of gap years	No gap	25	3.52	.74	0.47	.70
	1 year	11	3.52	.95		
	2-3 years	11	3.67	.45		
	4+ years	3	4.00	.33		

\* correlation is significant at a 0.05 level (2-tailed)

\*\* correlation is significant at a 0.01 level (2-tailed)

All other categories belonging to the SRL subscale were not significantly correlated to undergraduate year, graduate degree, gender, fluent languages, or number of gap years. The means and standard deviations for self-evaluation, environmental structuring, rehearsing and memorizing, and seeking social assistance can be found in Appendix F.

### Relationship Between Writing Self-Efficacy and SRL

A correlation analysis revealed that writing self-efficacy and SRL strategy use were significantly correlated,  $r = .49, p < .01$ .

A multiple linear regression was calculated to predict writing self-efficacy based on SRL strategy use and English language fluency. A significant regression equation was found ( $F(2,47) = 8.00, p < .01$ ), with an  $R^2$  of .26. SRL was a significant predictor of writing self-efficacy ( $\beta = .56, p < .01$ ), while English language fluency was not ( $\beta = .42, p > .05$ ).

The same regression analysis was used to predict SRL strategy based on writing self-efficacy. A significant regression equation was found ( $F(1,49) = 14.9, p < .001$ ), with an  $R^2$  of .24. Writing self-efficacy was therefore a significant predictor of SRL strategy use ( $\beta = .38, p < .001$ ).

We also broke the SRL strategy scale down into its subscale to determine what categories were correlated with writing self-efficacy, and each category showed a significant correlation except for seeking social assistance and reviewing records. Table 12 shows these correlations.

Table 12

#### *Correlations of SRL Subscale Categories with Writing Self-Efficacy*

<b>SRL Strategy Category</b>	<b>Correlations with Writing self-efficacy</b>
<b>Self-evaluation</b>	.341*
<b>Organizing and Transforming</b>	.574**
<b>Environmental Structuring</b>	.367**
<b>Rehearsing and Memorizing</b>	.279*
<b>Seeking Social Assistance</b>	.099
<b>Reviewing Records</b>	.143

\* correlation is significant at a 0.05 level (2-tailed)

\*\* correlation is significant at a 0.01 level (2-tailed)

Correlational analyses on writing self-efficacy and each item of the subscales that were significantly correlated with writing self-efficacy were also conducted. The Pearson's correlations are presented in Table 13.

Table 13

*Correlations of Individual SRL Strategies with Writing Self-Efficacy*

Subscale	Item	Pearson's correlation with writing self-efficacy ( <i>r</i> )
<b>Self-evaluation</b>	I check my work after I've finished before handing it in.	.355**
	I use other resources to check my work (e.g., other people, the internet).	.154
	I find ways to test myself after having learned a topic.	.243
<b>Organizing and Transforming</b>	I summarize important facts into main points while reading passages.	.479**
	I create an outline before writing a paper.	.449**
	I highlight important points while reading passages.	.402**
	I organize my notes to ensure I am clear about what I have to learn for a certain topic.	.337*
	I set goals for myself to complete tasks.	.296*
	I seek out additional information other than what I am given about a topic I am studying.	.270
	I take useful notes in class.	.403**
<b>Environmental Structuring</b>	While studying, I seek out an environment that optimizes my concentration.	.191
	I take breaks from my work when I feel tired.	.264
	I reward myself for completing tasks for school.	.309*

<b>Rehearsing and Memorizing</b>	I am able to memorize information for tests.	.251
	I complete practice exercises to make sure I understand certain topics.	.226

\* correlation is significant at a 0.05 level (2-tailed)

\*\* correlation is significant at a 0.01 level (2-tailed)

### **Medical Students' Attitude Towards Writing in Medical Education**

Though our scale did not reliably measure what we wanted it to measure, there was still valuable information to be extracted from the attitudes towards learning section of our survey. Using the individual items of this scale, we were able to gain insight into the value students placed on learning, and their willingness to learn. We were also able to evaluate students' perceptions of the current state of writing in the medical education curriculum.

**Value of writing and willingness to learn.** As shown in Table 14, medical students responded positively to most questions regarding their attitudes towards learning.

Table 14

*Students' Attitudes Towards Writing and Learning in Medical Education*

Scale item	Mean	Percent Frequency					
		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Missing Data
<b>It is important to have writing practices incorporated into medical education.</b>	3.50 (0.84)	0	14.0	30.0	48.0	8.0	3
<b>I enjoy reading articles in which issues of medicine are discussed.</b>	3.84 (0.72)	0	6.1	16.3	65.3	12.2	4

<b>One of the most important goals of medical school is to develop students' life-long learning skills</b>	4.12 (0.77)	0	4.0	12.0	52.0	32.0	3
<b>Rapid changes in medical science require constant updating of knowledge and development of new professional skills.</b>	4.50 (0.61)	0	0	6.0	38.0	56.0	3
		<b>Very Unlikely</b>	<b>Unlikely</b>	<b>Don't Know</b>	<b>Likely</b>	<b>Very Likely</b>	<b>Missing</b>
<b>How likely are you to attend a workshop or clinic offered by MUN to improve your writing skills?</b>	2.82 (1.11)	13.7	25.5	29.4	27.5	3.9	2
<b>How likely are you to attend a pre- or post-conference workshop or clinic to improve your writing skills?</b>	2.88 (1.03)	9.8	27.5	29.4	31.4	2.0	2

*Note:* Standard deviations are displayed in parentheses below their respective means.

Writing self-efficacy was negatively correlated with willingness to attend a workshop or clinic offered by the school to improve writing skills ( $r = -.42, p < .01$ ) and willingness to attend a pre- or post-conference workshop or clinic to improve writing skills ( $r = -.35, p < .05$ ).

After running a correlation analyses with individual items of the attitudes towards writing scale, enjoying reading articles in which issues of medicine are discussed was significantly correlated with SRL strategy use,  $r = .30, p < .05$ . Breaking the SRL scale down into its categorical components, we also found that the use of organizing and transforming strategies were positively correlated with enjoying reading medical articles,  $r = .39, p < .01$ . After running a correlation analysis for each specific strategy of the organizing and transforming category, we

found that enjoying reading articles in which medicine is discussed was positively correlated to every strategy except taking useful notes in class and creating an outline before writing a paper. The correlations are reported in Table 15.

Table 15

*Correlations of Individual SRL Strategies with Enjoying Reading Medical Articles*

<b>Organizing and Transforming SRL Strategy</b>	<b>Correlations with Enjoying reading articles of medicine</b>
<b>I summarize important facts into main points while reading passages.</b>	.368**
<b>I create an outline before writing a paper.</b>	.247
<b>I highlight important points while reading passages.</b>	.362*
<b>I organize my notes to ensure I am clear about what I have to learn for a certain topic.</b>	.367**
<b>I set goals for myself to complete tasks.</b>	.101
<b>I seek out additional information other than what I am give about a topic I am studying.</b>	.471**
<b>I take useful notes in class.</b>	-.0030

\* correlation is significant at a 0.05 level (2-tailed)

\*\* correlation is significant at a 0.01 level (2-tailed)

Neither writing self-efficacy nor SRL strategy use was correlated with students' responses to "It is important to have writing practices incorporated into medical education".

**Students' perceptions of the current state of writing in medical education.** Medical students had less positive responses to questions pertaining to how writing was implemented into the medical curriculum, and the instructional resources available to them (Table 16). Medical

students expressed dissatisfaction with the feedback they received from their instructors (64%) and the instruction they received on how to write in medical school (60%).

Table 16

*Students' Perceptions of Writing in Medical Education*

Scale item	Mean	Percent Frequency					Missing Data
		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	
<b>I receive instruction on how to write in medical school.</b>	2.40 (0.857)	10.0	54.0	22.0	14.0	0	3
<b>I receive helpful feedback on my writing from my instructors.</b>	2.28 (0.834)	18.0	42.0	34.0	6.0	0	3
<b>I understand what is expected of me and my writing on various assignments.</b>	3.16 (0.934)	2.0	26.0	30.0	38.0	4.0	3
<b>I use resources available to me to help with my writing.</b>	3.02 (0.979)	4.0	28.0	36.0	26.0	6.0	3
<b>I find the writing resources at the university effective in improving my writing skills.</b>	2.94 (0.740)	2.0	22.0	58.0	16.0	2.0	3

*Note:* Standard deviations are displayed in parentheses below their respective means.

Correlation analyses with certain items of this section of the attitudes towards writing scale revealed that writing self-efficacy was significantly correlated with receiving writing instruction in medical school ( $r = .36, p < .01$ ) and understanding what is expected of themselves and their writing on written assignments ( $r = .51, p < .01$ ).

There were no significant correlations between the SRL strategy use scale and items of students' perceptions of writing in medicine. However, one of the scale's categories (rehearsing and memorizing) was positively correlated with receiving instruction on how to write in medical school,  $r = .30, p < 0.05$ . Running a correlation analysis on the individual strategies of this subscale revealed the positive correlation existed between receiving instruction on how to write in medical school and the "I am able to memorize information for tests" strategy ( $r = .28, p < .05$ ), and not "I complete practice exercises to make sure I understand certain topics" strategy ( $r = .24, p > .05$ ).

### **Survey Comments**

Students' responses (Appendix G) to an open-ended question about their perceptions of writing in medical education were coded thematically. This thematic analysis revealed the following themes: students' writing self-efficacy, their attitudes towards writing in medicine, the heavy workload of the medical curriculum, and the limited writing instruction and feedback in medical education.

**Writing self-efficacy.** Though the survey focused on measuring students' writing self-efficacy, only one student commented further on the topic, linking it to the potential disconnect between faculty expectations and student's writing self-efficacy:

I remember in my final year of my undergrad I received a poor mark on one paper I wrote because my writing was "poor and unclear" but I had never received any feedback remotely like this before or since. This was a bit of a wake-up call for me as I realized that maybe my writing was not what I thought it was (although I also believe the expectations of instructors vary and perhaps some are too high). (Participant 2)



**Attitudes on writing in medicine.** Four students commented on their views on the appropriateness of the writing in medicine, ranging from very negative attitudes to very positive attitudes. One student didn't seem to find the value writing in medicine, and argued it is taking away from time spent on learning important medical concepts:

Many topics are repetitive and the related classes take up a huge portion of curricular time (classes that are 3 hours long could easily be 1). Then, we are rushing through scientific concepts that are integral to medical knowledge. The curriculum and assessment schedule is the poorest I've seen throughout my three degree programs.

(Participant 1)

Whereas another student saw the value of writing in medicine, but believed writing should be more discipline specific:

There also seems to be a lot of focus on personal and emotional reflection in writing in the medicine program at [Atlantic Canadian university]. While I agree that this is important, I believe there should be an increased focus on writing in the context of medical literature and other clinical applications. (Participant 3)

Finally, two participants viewed writing in medicine a very valuable component of their education, and commented on their willingness to improve their writing:

This is a very suitable survey as I believe there should be a greater focus on developing writing skills in medical school. Medical school students come from a wide variety of backgrounds so there should be some opportunities available for students to work on writing skills. (Participant 4)

Great idea! Would love to see some positive changes come as a results of this survey - particularly more writing training offered to Medicine students. Personally, I have no experience with reflective writing and would love to have a course/ workshop in what is expected of us as students in terms of our writing. (Participant 5)

These comments highlighted the polarized nature of this topic.

**Heavy workload.** Of the seven students that left remarks, three commented on the quantity of writing assessments in the medical curriculum. “Too many reflective assignments” (Participant 7) and “The amount of writing assignments, reflections, etc. in medical school is ridiculous” (Participant 1) were among the comments critiquing the amount of writing assignments. One student noted that due to a heavy workload, this may impact the effectiveness of the writing assignments:

During the preclerkship years there is a high number written assignments, which are placed on top of an extremely heavy workload. I have observed that students often take less time, and have less energy to produce high quality writing of these assignments. Many times, individuals simply write enough to hit the word count and have little care for content (Participant 6)

**Limited writing instruction.** Four comments touched on the need for writing instruction and resources in medical school. All comments seemed to agree that they have received little to no formal writing instruction in medical school. Participant 3 commented on their limited experience with instruction on writing: “During my studies in medical education and science

undergrad we are often expected to convey thoughts, ideas, and information effectively but outside of entry year english [*sic*] do not receive formal teaching on writing.”

**Feedback in medical education.** Two comments focused on feedback they received from their instructors, mentioning it was inconsistent and lacked useful constructive criticism:

Feedback on writing in the curriculum varies and seems to be dependent on the assessor that grades the papers. It is not unusual to have multiple faculty members assigned the task of grading a particular assignment or paper. Sometimes in-depth feedback is provided, other times one might receive no useful feedback [...] Sometimes the feedback provided seems too abstract, and would perhaps make more sense in the context of an arts program assignment. (Participant 3)

Participant 2 stated: “We often receive feedback on things that we write but the comments generally focus on the content and not on appropriate use of language to convey that content.”.

## **Summary**

Overall, medical students reported high writing self-efficacy, high use of SRL strategies, and showed signs of uncertainty about attitudes towards writing. There was a correlation between writing self-efficacy and SRL strategy use, but no relationship between these two covariates with students’ beliefs about the importance of writing in medicine.

To contextualize these findings and apply them to our research objectives, we must first discuss them in relation to the existing literature in the field.

## Chapter 5: Discussion

Writing self-efficacy, attitudes towards writing, and SRL are topics widely researched in literature. There is a gap in our understanding about how these three covariates are related in the case of medical students' writing competence. Using a social-cognitive theoretical orientation, we hypothesized that medical students' writing self-efficacy would be low, SRL strategy use would be high, and attitudes towards writing would be low. We also predicted that there would be a positive relationship between these three concepts, and that students would have a relatively limited background in writing.

### Medical Students' Performance

To address our first hypothesis and our first research objective, we measured students' writing self-efficacy, SRL strategy use, and attitudes towards writing.

**Writing self-efficacy.** Surprisingly, we found that medical students' perception of their writing competence was generally very good, which does not support our original hypothesis. Not one student ranked their writing ability as "poor". Most students indicated that they had little difficulty communicating their ideas in writing. A small percentage of the sample reported they often struggle to communicate their ideas in writing, but none reported having this issue all the time. This finding contradicted a previous study indicating that health care students struggle with their writing assignments (Miller et al., 2015). Medical students expressed confidence in their ability as writers, rating themselves highly on each item of the writing self-efficacy scale.

Students felt very confident in their ability to use appropriate vocabulary and word forms to communicate with the reader, and their ability to revise their writing to improve organization and development, which relates mostly to general writing skill. The responses to questions regarding their writing in the context of medical education were slightly lower, but not low

enough to reach statistical significance. This may indicate that students could be competent writers, but not skilled in applying their writing ability in the medical context.

A possible explanation for students ranking themselves high on the writing self-efficacy scale is provided by Ouwenel, Schaufeli, and Le Blanc (2013), who proposed that when self-efficacy is ranked highly, there could be over-confidence. Medical students may be too confident in their ability as writers, and this may not accurately reflect their writing competence.

We speculate that there could be a disconnect between students' writing self-efficacy, and their actual writing competence, otherwise known as calibration of self-efficacy (Artino, 2012). Students may feel confident in their writing but may be completely unaware how their writing measures up to the standard when judged by a skilled writer. Reading through the written comments of the survey, overall, the writing samples were generally articulate. However, we did notice there were a few typos and grammatical errors. This could be indicative of overconfidence.

Overconfidence may also be related to evaluating their performance against a low-achieving comparator group. One study reported that medical students valued discussing reflective writing activities with their peers (Vivekananda-Schmidt et al., 2011). This suggests that students may compare their writing performance with others. If medical students as a group are less skilled writers and have no other source of feedback except other students in the same program, they may assume that their level of performance is acceptable. Feedback helps students to grow their self-efficacy beliefs, and plays a prominent role in calibration (Artino, 2012). Therefore, feedback on writing from faculty should be clear and constructive, to reduce the gap between students' beliefs about their writing and their actual ability to write.

There was, however, a discrepancy between the scores received and some of the remarks left in the comment section of the survey. After receiving feedback on a written assignment from an instructor, one student noted that their writing may not be where they thought it was, and that faculty expectations may exceed students' writing capabilities. Yet there is no evidence in the survey results that students are struggling with their writing ability or writing self-efficacy. One explanation for this discrepancy may be that students feel the most free to express their negative views anonymously in this free text context of surveys (Borgstrom et al., 2016).

While we had hoped to compare outcomes by degree type (for example, students with an arts background versus students with a science background), there was very little variability in the results, as two thirds of the respondents had completed their undergraduate degree in science. Past literature on writing in the sciences as opposed to writing in the arts suggests there would be differences that existed between students of these different disciplinary backgrounds (North, 2005). Writing in the sciences tends to involve a lot of internal unity focused around the scientific method, leaving very little to interpretation. In contrast, writing in the humanities and social sciences is based around internal discord, valuing individual perspectives and interpretations (North, 2005). These differences highlight the discipline-specificity of writing between the humanities and the sciences, as the former requires a more text-based approach to writing, whereas the latter places the value on statistics and numbers.

**SRL.** Using SRL strategies was found to be a common practice amongst medical students. This does not come as a surprise, as SRL has been linked to high academic success and students being admitted into medical school are generally very strong academically (Cho et al., 2017). This is an important finding because knowing how students learn is a key step to implementing an effective curriculum. The strategies that medical students used most were those

most helpful in their academic careers. These strategies included checking work before handing it in, reviewing notes, and memorizing information. The strategies medical students used least points to areas of medical education that can be improved. For example, few students frequently reviewed their textbook before an examination. Perhaps students did not find their textbooks as useful as other resources, or that they do not always buy the textbooks for their courses. This may be a reflection of the digital age, where students prefer the use of digital learning resources over hardcopy versions. Further evidence to support this would be the fact that no students in our sample completed the survey in hardcopy form, opting to use the online version. This shift in learning material usage may therefore require a shift in the teaching resources offered to students by medical faculty.

Undergraduate year, degree type, gender, or number of fluent languages or gap years had no significant impact on students' overall SRL strategy use score. The SRL category subscale revealed that fourth year students used reviewing records strategies more than second year students, and that females used organizing and transforming strategies more than their male counterparts. Past research in gender differences and SRL supports our finding that females demonstrate more self-regulation than males (Tseng, Liu, & Nix, 2017).

**Attitudes.** Students appeared to be divided on the importance of writing in medical education, which supports the ambiguous nature of the topic in past literature (Arntfield et al., 2013; Borgstrom et al., 2016; Chen & Forbes, 2014; De la Croix, Rose, McKinlay et al., 2017; Vivekananda-Schmidt et al., 2011; Walker, 2015; Wildig, & Willson, 2011).

The majority agreed (48%) or strongly agreed (8%) that writing was important. This same polarization was represented in students' comments. Some students were very interested in improving their writing, and even suggested there be more writing resources available to

understand what is expected of them and their writing. This finding supports the incorporation of the arts into medicine through reflective writing. In contrast, there was also a percentage of students that disagreed (14%) with the statement. Comments from students reflected frustration that class time devoted to writing activities was wasteful when there could be more time devoted to “medical” content. This encompasses the science-based argument on the issue that tends to discount writing as a valuable educational tool in medicine. This perspective omits the bigger picture of medicine being more than just analyses and diagnoses. Medicine is a field that requires good communication and a strong sense of professionalism, both of which can be conveyed through writing. And though communication and professionalism are hailed as qualities of a successful physician, the vehicle through which these skills are demonstrated is at times being forgotten, as made evident by the survey results. This is the link that students may be missing between writing and their success as a physician.

A large percentage of students neither agreed nor disagreed (30%) with this statement, further muddying the water in terms of how students feel about writing in medicine. This could very well reflect the indifference of medical students towards the subject of writing. Neutrality on this statement could therefore be indicative of the value students place on writing in medicine, and their disengagement with the writing process.

Another possible explanation for this ambiguity is presented in a comment by Participant 3, who mentioned they understood that writing was important, but it needed to be brought into a more medicine-oriented context, rather than assignments that resemble an exercise in the arts. This would explain the hesitancy to choose one way or the other, as the value of writing is conditional on the context in which it is being used. This speaks to the false binary of arts and



science in medicine, in that there should not be too much of one or the other. Instead, there should be a careful balance of both.

These findings add to the uncertainty surrounding writing in medical education in the literature, and the difficulty of ensuring this skill is being developed. If students don't value writing in medicine, effectively incorporating writing into the medical curriculum may become increasingly problematic. The findings of this study indicate that the lower the SRL strategy use, the lower the writing self-efficacy. In other words, SRL depends on motivational processes, and if students aren't motivated to learn, they will be less likely to engage in SRL strategies such as seeking out educational resources or reviewing their work.

### **Relationship Between Writing Self-Efficacy, SRL, and Attitudes**

To address our second research question, we examined the relationships between writing self-efficacy, SRL strategy use, and attitudes towards writing. Our hypothesis was that the three factors of writing competence examined in this study were positively correlated, which was partially supported by the results.

**Writing self-efficacy and SRL.** Medical students' writing self-efficacy was positively correlated with their SRL strategy use. Our findings echo past research concerning writing self-efficacy and SRL (Bernacki et al., 2014; Bruning et al., 2013). SRL was the main predictor of writing self-efficacy, and writing self-efficacy can also be used to predict SRL strategy use. This reinforces the idea that students possess motivation to write in medical education, as self-efficacy is the biggest indicator of motivation (García-Sánchez & de Caso-Fuertes, 2005).

When the scale was broken down into its individual categories, self-evaluation, rehearsing and memorizing, organizing and transforming, and environmental structuring strategies were positively correlated with writing self-efficacy. Seeking social assistance and

reviewing records were not positively correlated with writing self-efficacy. Examining the items of the subscale themselves, checking work, summarizing, creating outlines, taking notes, organizing notes, highlighting important points, and rewarding oneself were all the individual strategies that were linked with writing self-efficacy. It is interesting to note that each type of self-regulation as defined by Zimmerman's (1989) Triadic Analysis of SRL is represented in these significantly correlated categories. Strategies of behavioural, personal, and environmental self-regulation were correlated with writing self-efficacy.

**Attitudes with Writing Self-Efficacy and SRL.** Many of the items on the attitudes towards writing scale were not correlated with students' writing self-efficacy nor their SRL strategy use. This included students' responses to "It is important to have writing practices included in medical education". These results do not support our hypothesis. Our findings are also at odds with past research that suggests that attitudes towards writing is linked with writing self-efficacy (Rosário et al., 2016; Soylu et al., 2017) and SRL (Hammann, 2005). There is one possible explanation for our inability to capture the relationship between attitudes towards writing, writing self-efficacy, and SRL. Writing self-efficacy beliefs and attitudes towards writing may be difficult to quantify on a self-report measure, and may be more easily quantified with on-task measures instead (Rosário et al., 2016; Rosário et al., 2017; Tore et al., 2017). Additionally, the low response rate may also have reduced the study's power to detect all significant relationships among study variables.

There was a negative correlation that existed between students' willingness to attend workshops or clinics to improve writing skills and writing self-efficacy, meaning students who were less confident about their writing ability were more likely to want to seek out this resource

to improve their writing. This indicates that students who are struggling and who need help the most will benefit from this specific educational intervention.

Students' SRL strategy use scores were positively correlated with their enjoyment of reading articles that discuss medicine, and we were able to pinpoint the correlation to be caused by the organizing and transforming strategy category. This makes sense, as the questions in this section includes the subcategory of "seeking information". It would be logical for students who get enjoyment out of reading articles in medicine to seek out these articles in their learning process.

### **Experience with Writing**

To address our third research objective, we evaluated students' background and experience with writing. We looked at degree type, the number of publications before and during on-going medical education, and the level of writing instruction and feedback they had received on their writing. Though there was no significant correlation between these variables and writing self-efficacy, there is still valuable information to extract from students' responses. Overall, medical students don't seem to have a significant amount of experience with writing. This corresponds with the findings from Arum and Roksa (2011) who reported that over half of undergraduate students in their sample of 2300 students had little experience with writing.

Though medical school takes students with degrees from every educational background, our sample is definitely skewed towards a background in the sciences. There were only four students who didn't have a strictly science background, none of which reported any specialty in English. The majority of these students therefore have little specific writing instruction experience and have likely only completed the six mandatory English credits (or two English courses) that are required of most undergraduate degrees in the sciences. With such little

experience with English, it might be easy for students to miss the value of a skill that hasn't been prominent in their education. This limited representation of students with a background in English is also perhaps an indication of the proportion of English students applying for medicine. We speculate that with the false polarization of arts and sciences that English students may be discouraged from applying. This overwhelming dominance of science students in our sample may be a result of the view that medicine is a science rather than a healthy combination of both the sciences and humanities.

We also examined students' experience with specific writing instruction. The majority of students reported having had occasional to moderate specific writing instruction during their undergraduate/graduate education, with only a small percentage that reported receiving a great deal of instruction. There was also a significant number of students that reported they rarely or never received specific writing instruction. This is alarming when considering most students are expected to complete numerous written compositions of varying lengths, even in the disciplines that are geared towards the sciences. These students find themselves facing the high stakes of writing of medical school with very little experience with post-secondary writing instruction.

Publishing work in medicine is a valuable way to share important findings and breakthroughs with the medical community. Prior to entering medical education, just under half of the students surveyed reported having published no written work, even more hadn't published since entering medicine. Even those that reported having published their work, the majority of these students have published once or twice. This means that many students lack the experience of writing to publish, and the knowledge and skill involved in such a writing process. Without the knowledge base to properly disseminate information, there may be large gaps left in the literature. Research may still be successfully carried out and the results well-understood by the

physician, but it would contribute very little if they were unable to effectively communicate their findings through mediums such as journals or books. This is one of the reasons why EPA 6 is fittingly mapped onto the CanMEDS role of the communicator. Without experience in communicating scientific findings, it would be difficult to contribute to medical knowledge.

To determine students' past experience with feedback, we asked if they had received any formal feedback from instructors on their writing during the undergraduate education, and their responses were mainly positive. There were no students that hadn't received any feedback at all, nor were there very many who had rarely received feedback. The majority of students noted they had received feedback in some form. It is reassuring to know that even though these students may not have received much specific writing instruction in the classrooms, that their writing has not gone unchecked entirely. However, this may also be frustrating for students, as they may have received critiques on a skill that was never formally taught to them in a post-secondary setting. Though frustration has been proven in some cases to contribute to motivation (Amsel & Roussel, 1952), excessive frustration may have a negative impact on students' motivation to write. Social-cognitive theory would therefore predict a decrease in students' writing self-efficacy, SRL, and attitudes towards writing with a decrease in motivation.

Due to students' lack of experience with writing in post-secondary education, we were able to assume that these students entered medical school with minimal knowledge of the proper conventions of writing.

### **Writing in the Medical Education Curriculum**

Finally, our fourth research objective was met by identifying issues in the competency-based medical education curriculum that may be impeding the development of students' writing competence. There was dissatisfaction expressed about how writing was being implemented in

medical education. This included writing instruction and feedback in medical education, limited space in the curriculum, and a potential static learning environment. This adds to the growing body of research that calls for change in the medical education curriculum (Arntfield et al., 2013; Burks & Kobus, 2012; Johna & Dehal, 2013; Ramesh, 2013; Walker, 2015).

**Writing instruction in medical education.** Receiving proper writing instruction in medical school is important when considering students' perceptions of their own writing competence. Receiving instruction on writing was positively correlated with better writing self-efficacy along with understanding what is expected of them on written assignments. Students should feel prepared when tackling writing assignments in the medical curriculum, which would involve proper writing instruction. However, the survey results indicated that the vast majority of students reported that they did not receive writing instruction, other than mandatory undergraduate English courses. This was the lowest ranked item on the questions pertaining to attitudes towards writing in medical education. Some commentary went on to mention they had no prior experience with reflective writing. Students were also split on understanding what was expected of them on writing assignments. These findings supplement past research indicating that writing instruction is not, for various reasons, incorporated into the medical education curriculum (Ariail et al., 2013; Crowson, 2013; Melvin et al., 2015; Smith et al., 2011; Stephens et al., 2012). Proper instruction should be allotted for a competency that is required by LCME to graduate into residency. Without proper instruction, students run the risk of failing to meet all 13 EPAs.

**Feedback on writing in medical education.** Feedback has been identified as a key component to competent writing (Bijami et al., 2016). The types of feedback examined in this study included instructor feedback, peer feedback, and institutional feedback

Students' comments indicated that they were receiving inconsistent feedback from faculty on writing assignments, and that the feedback mainly focused on content, not on the use of language itself. Our data also shows that the majority of medical students felt they didn't receive helpful feedback on their writing from their instructors. This supports findings in the literature, which also report inconsistency in instructor feedback (Melvin et al., 2015).

We expected students to rely on their peers for assistance because of findings from other studies in the field of peer feedback (Lin & Yang, 2011; Mahfouz, 2010; Vivekananda-Schmidt et al., 2011). However, this was not the case, with the majority of medical students reporting that they did not seek assistance from their peers when they do not understand a particular topic.

In terms of institutional feedback, there was a large amount of ambiguity in the students' responses pertaining to the writing resources available to them at the university. Only 32% of students reported using writing resources, and 18% of students reported that the university's writing resources improved their writing ability. The rest of the sample either didn't use the resources, or found the resources to be unhelpful. One possible explanation may be that this university does not have a discipline-specific writing centre; these results were anticipated and support findings from other studies critiquing general writing centres as opposed to those that are discipline-specific (Smith et al., 2011; Ariail et al., 2013). We also speculate that medical students may not actively seek out institutional writing resources, as they already possess high writing self-efficacy. This would link back to the concept of over-confidence in students with high self-efficacy: If they believe they already possess a skill, they may feel as if they don't need to develop it further.

It does not appear that medical students are receiving quality feedback on their writing compositions, ranging from instructor and peer feedback to institutional feedback. Though there

was no correlation between feedback and writing self-efficacy or SRL, this could have been a result of low sample size. Poor quality feedback can therefore not be discounted as having a negative impact on student writing competence.

**Limited space in curriculum.** There was a common theme woven through some of the negative comments about writing in medicine, and that was there was simply no time for writing in the curriculum. Participants noted that there were too many writing exercises taking away from medical content, and that because of a heavy workload, students were too exhausted to put in their best effort into writing assignments. The heavy workload of medical school has been reported in the past to contribute to excessive work demands, and a major source of stress and burnout (Chang, Eddins-Folensbee, & Coverdale, 2012).

This is an issue that has been raised in the past, and has led to disengagement in the writing process (Vivekananda-Schmidt et al., 2011). The goal of reflective writing practices is for students to take the time to think back on encounters and produce a highly introspective text. Writing for quantity and not quality undermines the reflective process, and means that students may not benefit at all from these assignments. They would be writing to hit word counts, not to create valuable content. If students are not benefitting from the reflective writing assignments, they are losing their chance to further develop empathy.

**Potential static learning environment.** A longitudinal study that follows students across their educational experience has the benefit of observing how students progress through their degree program and the skills they develop along the way. Given the time constraints of this degree program, a survey that intended to collect data from students in each of four years of their medical program offers a glimpse of the progression of writing self-efficacy, SRL strategy use, and attitudes towards writing throughout medical school. We expected to find that all three



covariates would increase over the years as students gained more experience with writing in this context. If a curriculum encouraged growth in writing ability and SRL skills, we would expect to see a significant difference between the mean scores of first year and fourth year students in these areas. However, we found writing self-efficacy and SRL strategy use across all three years of medical students did not differ significantly. This is consistent with the results of Lucieer and colleagues (2015) who, after comparing first and third year medical students' SRL levels, found that for the most part, SRL levels did not differ between these two groups of students. The only difference that was observed in the present study between the years of medical students was the finding that fourth year students used reviewing record strategies more than second years. This is what we were expecting to find in the analysis with SRL strategy use scale as a whole, but perhaps this is a small indication that some SRL strategy use development is ongoing. Due to students' seemingly unvaried SRL and writing self-efficacy scores, we believe there may not be enough opportunities to develop confidence in writing and SRL strategies in the curriculum, which begs the question of what can be added to the medical curriculum to challenge students to develop their writing and SRL skills.

This finding could be attributable to a ceiling effect (Lucieer et al., 2015). In other words, students entering medical school may already be exhibiting high levels of SRL and writing self-efficacy and therefore would not exhibit much development in these areas over the course of the program. Our results do not indicate that medical students scored extraordinarily high on either scale, so this is a less likely explanation.

## Implications

There are many pedagogical implications for the present study. Determining that medical students are confident in their writing ability and are good self-regulated learners is useful for developing students' writing ability, especially since both factors are predictive of each other.

Medical students ranked their writing self-efficacy high on the scale we created; however, survey responses and comments suggested there was little in-class instruction, if any at all. This skill should be allotted appropriate instruction time in-class, like any other skill required by the LCME. Curricular changes should be made to better accommodate medical students' writing backgrounds and writing competence. And if the curriculum simply does not allow it, there should be optional opportunities outside of class time for students who wish to improve their writing. As written communication is one of the core competencies required to become a physician by the LCME (AFMC, 2017), education on written communication should not be left solely to the discretion of students. Though self-directed learning caters well to students' varied learning styles, there should be supports in place for those who need it. Writing is therefore irrefutably valuable to the developing physician, and without learning this skill properly, medical student writing will suffer.

Song and Stewart (2012) recommend incorporating writing into the curriculum in a way that is seen as valuable by the medical students. Our findings suggest that students at this university have mixed feelings about the value of writing in medicine, which should be one of the first issues addressed. Curricular changes could be made to better reflect the students' wants and needs. Writing should be taught as a skill in medicine, and not categorized as belonging strictly to the arts, so students can understand the link between writing ability and positive

clinical outcomes. This would re-contextualize writing in medicine for the students that noted they were detached from the writing.

Our findings indicate the categories of strategies used most by students, as well as the individual strategies, and which ones were correlated with writing self-efficacy. Medical teaching faculty could benefit from using these results to adjust the way they teach to better suit the SRL strategies their students reported using. For example, students reported not using their textbooks very often to study, but did report high use of reviewing notes. Faculty could therefore benefit from spending more time focusing on notes given in class, or presentations posted online to ensure students' master the concepts being taught. The use of digital technologies are also reported to be useful in health profession education, and could be considered an increasingly valuable educational tool in this digital age (Curran et al., 2017).

Our findings indicate that medical students place an importance on feedback they receive on their writing, in particular, the consistency of this feedback. To address this concern, we propose medical faculty looking at strategies like those presented by Mahboob (2015), who defined effective feedback as requiring cohesion (purposeful and structured) and coherency (ability to clearly indicate what, why, and how revisions need to be made). Using this perspective, instructor feedback shouldn't be disconnected and unorganized, but rather a text that comments on carefully selected issues in the student's writing. According to the university website, a resource exists for faculty to learn how to give effective feedback, and would be an ideal setting to share these feedback strategies with instructors. Incorporating strategies to increase cohesion and coherence of feedback into this resource for faculty could improve the level of consistency in the feedback students are receiving, and help them understand what to expect and how to respond to the feedback (Mahboob, 2015).

Writing resources can also be discussed to improve student writing. At first glance, it only appeared as if some medical students expressed interest in writing workshops as a resource to improve their writing competence. It was only until we uncovered that medical students with lower writing self-efficacy were more inclined to attend these proposed writing workshops that we realized the importance of establishing this type of writing resource. This correlation suggested that the students who need help to improve their writing will benefit the most from the implementation of writing workshops. These workshops could be used to supplement in-class instruction and provide more in-depth analysis of the writing process in medical school.

That being said, there may be an issue with attendance for these workshops. When compared to mandatory classes, attendance for non-mandatory classes, such as one on writing competence, may be low. To address this potential issue, writing instruction could be incorporated into pre-existing activities in the medical curriculum. For example, in the first two years of medical school, an independent project is required of all students, where a significant amount of written work is required. Writing instruction and feedback incorporated into ethics applications, research proposals, and dissemination initiatives would be an efficient means of developing students' writing ability without adding to their overall workload.

Regardless of what the future holds for research pertaining to writing in medical education and student perspectives, we stress the importance of maintaining writing in the medical curricula. Though we recognize there is a heavy course load of scientific content to incorporate in the curriculum, writing should always be used to assist in meeting academic goals, whether it be writing to learn, or writing to demonstrate learning.

## Study Limitations and Future Recommendations

We also recognize there were issues with the design and implementation of this study. The limitations outlined in this study create a foundation for the design of future research, to ensure the conclusions drawn are truly representative of the medical student population.

**Correlational analyses.** Much of the analyses ran on the data collected for this study is correlational. Though this is a good way to collect large amounts of data relatively quickly and to uncover relationships between variables, correlational studies cannot establish causal relationships (Thompson & Panacek, 2007). Though we were able to report that a relationship exists between medical students' writing self-efficacy, SRL strategy use, and certain elements of attitudes towards writing, we were unable to determine if a change in each of these variables is attributable to one another, or to variables beyond the scope of this research.

The present study was an attempt to explore an under-represented area of research. This study therefore lays the foundation for future research. We have established that medical students for the most part rate their writing self-efficacy highly and are good self-regulated learners, and that their writing self-efficacy most likely motivates the use of SRL strategies. Now there needs to be a focus on the "why" behind our findings. Why do students use certain SRL strategies over others, and why do they feel they are competent writers? These are some of the questions that emerge from the present research that require future action. We also propose a causational design for future studies to go beyond the correlational relationships identified in this study between writing self-efficacy, SRL strategy use, and attitudes towards writing.

**Sample size.** Despite our best efforts, there were issues with recruitment and low response rate (16.6%) for this study. We recognize that this poor response rate impacted the generalizability and power of our results.

Low response rate is not a surprising finding, as survey research literature has widely reported the decline of respondent cooperation in developed countries, as over the years. Surveys have changed from being an obligation to a choice or convenience (Colbert, Diaz-Guzman, Myers, & Arroliga, 2013; Klabunde et al., 2012; Rindfuss, Choe, Tsuya, Noriko, Bumpass, & Tamaki, 2015). Ideally, researchers should aim for a response rate of 60% or higher (Fincham, 2008). However, in the field of medicine and surveying physicians, response rates of around 35-40% are common (Colbert et al., 2013; Cunningham et al., 2015). Sometimes studies report that low response rates are due to the nature of the curriculum, such as placements and rotations outside of the university campus (Mahlanze & Sibiya, 2017). Burden of survey and lack of time were reported as the main reasons for physicians to not complete surveys (Cunningham et al., 2015).

There are some possible explanations for our low response rate. We were unable to send e-mails out at the pre-arranged times due to re-scheduled classes. This may have impacted the effectiveness of reminding students to complete our survey. We were also unable to meet with third-year students in person since they were scheduled at locations remote from the campus. This was most likely the reason behind the absence of third-year students from our sample, which accounted for 25% of our sample population.

Our choice of data collection tool may have impacted our response rate, as medical students receive an abundance of e-mails a day. It is likely that our invitation to participate was buried in other research-related e-mails. Finally, we also speculated that our low response rate could be indicative of the lesser importance medical students' place on writing skills. Perhaps those who did not participate were those that did not value writing as an important skill in medical education.

**Scales.** The scales used to measure writing self-efficacy, SRL strategy use, and attitudes towards writing were all developed from scales used in past literature. We did not use scales directly from other research because we wanted to study these variables in a medical education setting, and found no scales existed that encompassed what we wished to measure. As a result, the scales used were not previously verified scales. We accepted the risk that the scales would not reliably measure what we set out to measure. This was the case with the attitudes towards writing scale. Therefore, all results related to attitudes towards writing were based on analyses of individual items of this scale.

We suggest creating and validating a scale for attitudes towards writing in medicine. Different scales exist for general attitudes towards writing, but none exist that reliably measure students' attitudes towards writing in a medical education context. This would be a valuable tool in research concerning writing in medical curricula since writing is so discipline-specific, and students' attitudes towards writing may change based on the context. We suggest including more questions focused around students' beliefs about the various aspects of writing.

**Limited perspective.** The current study was also limited because it focused tightly on one aspect of a multi-dimensional problem. There are other perspectives that would be valuable in creating a more holistic view of writing in medical education, such as medical faculty, or institutional perspectives. This project focused on identifying the areas of concern with the medical students. Survey results also cannot explain the "why" behind those concerns. Qualitative research must be conducted to better understand the reasoning behind why medical students believe they write well, but express so much dissatisfaction with the curriculum.

The results of this study are also localized to the medical students that took part in this study. The findings are in no way representative of other students who didn't take part in the

study, from this university or from other universities across Canada. Further research will be needed to determine if students' perspectives vary from different medical schools and medical curricula across Canada.

Future studies should also focus on comparing medical students' writing self-efficacy and their actual writing competence, addressing the calibration of self-efficacy. One way we propose in tackling this issue is gaining the medical faculty perspective to determine if there is a disconnect between students' writing self-efficacy, and the grades they receive on writing assessments.

### **Conclusions**

LCME requires medical students to possess good written communication skills, but there has been very little focus on the measure and development of this skill in past literature concerning medical education. This study was a novel approach to this issue, using the perspective of students' themselves to better understand the role writing self-efficacy, learning strategies, and attitudes towards writing, have in medical education. Using these three covariates, we were able to quantify students' writing self-efficacy, SRL strategy use, and attitudes towards writing. We identified relationships amongst them. We were also able to determine students' experience with writing, as well as any issues that may impede their writing ability. Based on the findings of this study, the following conclusions can be drawn concerning writing from a medical student perspective.

Firstly, writing self-efficacy and SRL strategy use were high in medical students at one Atlantic Canadian university. There was ambiguity in the results concerning writing self-efficacy. Data from the survey questions revealed that students were of the strong belief they possess good writing skills. However, there was commentary that suggested students were not



satisfied with their writing learning environment and their level of confidence with writing. Students reported that they make good use of most every SRL strategy that made up the devised scale. This suggests that they believed they are prepared to meet the LCME standards of written communication when they graduate into residency. Students' attitudes towards writing were similarly ambiguous. This may be an indication of some indifference that exists with medical students and their beliefs about writing. Students should not be ambiguous on writing in medicine, as it is a skill important to communication and professionalism, as well as the development of empathy. More work needs to be done in order to ensure the link between writing and success as a physician is made obvious to students.

Secondly, there is a positive relationship between writing self-efficacy and SRL strategy use. Students who reported higher writing self-efficacy also reported higher SRL strategy use overall. The better students' perceive their writing ability, the more use they made out of the SRL strategies. Self-regulation appears to be a large component of the writing process. We were unable to determine the relationship between attitudes towards writing as part of a definitive scale, but there was no significant correlation between SRL or writing self-efficacy and students' belief about writing being incorporated into medical education. The level of self-regulation had no impact on how students felt about writing in medicine, nor did students' belief about their own writing skills. This is definitely counter-intuitive, as we would expect students to value a skill if they perceived themselves to be competent at it. We would also expect students who were more self-driven in their education to place higher value on aspects of their education than those who were less self-regulated. Perhaps this emphasizes the need to teach students why writing is important in medicine, and how it is linked to success as a physician.

Thirdly, medical students do not have an extensive background in writing, based on our analyses of students' undergraduate/graduate degree type, their publications, and their past history with writing instruction and feedback. It cannot be assumed that these students have been properly taught how to write in post-secondary education, as the majority of our sample had educational backgrounds strictly based in the sciences. Even students with arts backgrounds didn't come from areas with a major focus in English. With this little experience with writing, medical students may be missing the link between good written communication skills and being a successful physician.

Lastly, there are issues with how writing is implemented into the medical education curriculum. Students report that oftentimes writing instruction and feedback are not incorporated into the curriculum. Moreover, students from different years of medical education show no difference in levels of writing self-efficacy and SRL strategy use for the most part. This may indicate there aren't ample opportunities for students to develop their confidence in writing, or their SRL strategy use.

These findings contribute to what we know about medical students' experiences with one of the EPAs required to graduate. The present study serves as one approach to this very convoluted issue within medicine. We investigated motivational factors that are known to influence writing competence. From this, we highlighted learning strategies that are linked with writing self-efficacy, and that the value of writing in medicine may be lost on some students. Several gaps have also been identified within the medical education system in this study. Bridging these gaps, targeting the value of writing, and utilizing students' preferred learning strategies would ensure that medical students are well on their way to develop the written communication skills necessary to be an empathetic and professional health care provider.

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## Appendices

### Appendix A: EPAs and CanMEDS Competencies

Table 17

*AFMC's EPAs and Their Respective Competencies\**

EPA	Competencies
	<ol style="list-style-type: none"> <li>1 Obtain a history and perform a physical examination adapted to the patient's clinical situation</li> <li>2 Formulate and justify a prioritized differential diagnosis</li> <li>3 Formulate an initial plan of investigation based on the diagnostic hypotheses</li> <li>4 Interpret and communicate results of common diagnostic and screening tests</li> <li>5 Formulate, communicate, and implement management plans</li> <li>6 Present oral and written reports that document a clinical encounter</li> <li>7 Provide and receive the handover in transitions of care</li> <li>8 Recognize a patient requiring urgent or emergent care, provide initial management and seek help</li> <li>9 Communicate in difficult situations</li> <li>10 Participate in health quality improvement initiatives</li> <li>11 Perform general procedures of a physician</li> <li>12 Educate patients on disease management, health promotion, and preventative medicine</li> </ol>

*\*Note:* from AFMC (2017)

Table 18

*CanMEDS Competencies and Their Respective Educational Outcomes\**

<b>CanMEDS Competency</b>	<b>Educational Program Objectives</b>
<b>Medical Expert:</b> To acquire, interpret and apply knowledge to effectively provide patient care in health, disease and illness.	<ol style="list-style-type: none"> <li>1. Take a complete and accurate patient-centered history appropriate to the patient's presentation</li> <li>2. Perform a complete and accurate physical examination of the patient's problem</li> <li>3. Perform appropriate diagnostic and therapeutic procedures relevant to the presenting patient problem</li> <li>4. Identify key clinical problems following assessment of a patient</li> <li>5. Manage key clinical problems following assessment of a patient</li> <li>6. Apply knowledge of the clinical, socio-behavioural, and fundamental biomedical sciences relevant to a clinical problem</li> </ol>
<b>Communicator:</b> To communicate effectively with patients, families and others involved in the delivery of patient-centered care.	<ol style="list-style-type: none"> <li>1. Appropriately develop and maintain ethical relationships, rapport and trust with patients and families</li> <li>2. Accurately elicit information and perspectives from patients and families, colleagues and other professionals.</li> <li>3. Accurately convey relevant information and explanations to patient and families.</li> <li>4. Develop a shared plan of care with patients, their families, and other professionals.</li> <li>5. Effectively convey oral and written information associated with a medical encounter.</li> <li>6. Communicate effectively with third parties other than health professionals.</li> </ol>



**Collaborator:** To work in partnership with health care teams to achieve optimal patient care.

1. Collaborate effectively within the health care system.
2. Consult effectively with physicians and other health care professionals to provide care for individuals, communities, and populations.
3. Participate effectively on health care teams.
4. Manage conflict effectively

**Manager:** To achieve balance within the work environment as individuals, as members of teams or groups and as participants in the health care system.

1. Effectively manage practice and career.
2. Allocate health care resources effectively
3. Participate appropriately in the health care system

**Health Advocate:** Promote and respond to the health needs of individual patients, communities and populations.

1. Identify the important determinants of health, the risk factors for illness, the interaction between the population and their physical, biological and social environment, and personal attributes.
2. Identify public policies and trends that affect health locally, nationally, and globally, and barriers to access from populations, including persons with disabilities, the underserved and the marginalized.
3. Know and understand the key issues in the Canadian health system and any relevant laws and legislation.

**Scholar:** Using a variety of relevant resources, apply ongoing, self-directed learning skills to

1. Develop a plan for personal continued education.
2. Apply principles of research and information management to learning and practice.

critically evaluate a clinical problem.

3. Facilitate the learning of others as part of professional responsibility (patients, health profession, society)

**Professional:** To demonstrate a commitment to the health and well-being of their patients, profession, society and self through ethical practice.

1. Demonstrate an understanding of the following as a medical professional:
2. Accountability - To self, patients and their families, society, the medical profession, other health professionals and the health care system
3. Integrity
4. Altruism

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\*Note: obtained from CanMEDS competencies 2012

<b>1. Short description</b>	<p>The graduate presents a concise and relevant summary, including pertinent positives and negatives of a clinical encounter to members of the team (including patients, and when legally relevant, family members) facilitating ongoing care. He/she follows legislation (e.g.: privacy legislation) and confidentiality considerations.</p> <p><i>This EPA includes various types of documentations of clinical encounters (e.g.: admission notes, consultation notes, discharge summaries, etc.)</i></p>	
<b>2. Most relevant CanMEDS roles</b>	<p>Medical Expert Communicator Collaborator Professional</p>	
<b>3. Entrustable behaviours</b>	<p><b>Pre-Entrustable</b></p> <p>The learner</p> <ul style="list-style-type: none"> <li>• Presents a summary which is unfocused, inaccurate, disorganized and lacking important information</li> <li>• Does not demonstrate shared understanding among patient, the health care team members and consultants</li> <li>• Documents findings in an unclear, unfocused or inaccurate manner</li> </ul>	<p><b>Entrustable</b></p> <p>The learner</p> <ul style="list-style-type: none"> <li>• Presents a concise and relevant summary of a patient encounter to members of the healthcare team</li> <li>• Presents a concise and relevant summary to the patient, and where appropriate, the patient's family (caregiver/advocate)</li> <li>• Specifies the patient context in the report</li> <li>• Demonstrates a shared understanding among the patient, the health care team members and consultants through oral and written reports</li> <li>• Documents findings in a clear, focused and accurate manner</li> </ul>
<b>4. Assessment suggestions</b>	<p>This EPA should be assessed by direct observation in various clinical contexts (including common acute and chronic medical conditions) with patients of various age groups including children and their parents, adults and elderly individuals.</p> <p>It can also be assessed using simulated patients and/or objective structured clinical examinations.</p> <p>It can also be assessed by reviewing charts.</p>	

Figure 3. Entrustable Professional Activity 6. A detailed description of EPA 6.

	Medical Expert	Collaborator	Communicator	Health Advocate	Leader	Professional	Scholar
EPA 1 History and PE	X		X			X	X
EPA 2 Diff diagnosis	X		X			X	X
EPA 3 Investigation plan	X			X	X	X	
EPA 4 Dx & Screening Tests	X	X	X		X		
EPA 5 Management plans	X	X	X				X
EPA 6 Report Clin encounter	X	X	X			X	
EPA 7 Provide/Receive Handover	X	X		X	X		
EPA 8 Urgent/emergent care	X	X	X		X		
EPA 9 Difficult situations	X		X	X		X	
EPA 10 Quality improvement	X	X			X	X	
EPA 11 Procedures	X	X	X				X
EPA 12 Educate patients	X	X	X	X			

Figure 4. EPAs mapped onto CanMEDS roles. *Illustrates the relationship between EPAs and CanMEDS roles.*


## Appendix B: Undergraduate Medical Curriculum

Year 1			Year 2		
Phase 1			Phase 2		
5710: The Healthy Person 5720: Clinical Skills I 5730: Special Projects I 5740: Community Engagement I			6750: The Patient: Acute or Episodic Health Problems 6760: Clinical Skills II 6770: Special Projects II 6780: Community Engagement II		
Phase 3			Phase 4		
7710: The Patient: Chronic Conditions 7720: Clinical Skills III 7730: Special Projects III 7750: Community Engagement III			7740: Phase 4 Preparation		
Year 3			Year 4		
Phase 4			Graduation		
8710: Core Experiences			8720: Advanced Procedural Competencies		
8750: Practice Continuum			8730: Electives 8740: Advanced Practice Integration		

Figure 5. Curriculum Map of the Four Year Undergraduate Medical Education Class of 2019. Illustrates the courses required to complete medical education.

## Appendix C: Original Study Documents

### C1: Survey



**Medical Students' Perceptions of Writing Competence in Medical Education**

**STUDY INFORMATION AND CONSENT TO PARTICIPATE**

This survey is part of a research study of MUN medical students' approach to developing writing skills and is being conducted by Diana L. Gustafson and her master's student, Emily Pye, both in the Faculty of Medicine.

Taking part in this study is **voluntary**. It is up to you to decide whether you want to complete this survey. Before you decide, you need to understand what the study is about, what risks you might take and what benefits you might receive.

**Purpose of study:** The purpose of this study is to better understand Memorial University medical students' attitudes and experiences with developing writing competencies.

**Participation:** If you agree to participate in this survey, you will be asked a series of questions about your writing skills, your learning style, your attitudes toward writing, and some demographics. You do not have to answer any questions that you do not want to answer.

**Benefits:** Participating in this survey may not benefit you directly although you may benefit from becoming aware your attitudes toward written communication skills, your motivation to develop these skills and identify appropriate resources.

At the end of the survey, you will be asked if you want your name entered in a draw for one of ten \$20 Tim Horton gift cards. Participating in the draw is completely optional and winners will be contacted via email at the end of the data collection period.

You will also be asked if you want to receive information about taking part in a focus group interview. This is also optional.

**Possible risks and discomforts:** Your survey responses and any contact information you provide will be stored on a password protected software platform. There is the unlikely possibility that the platform may be hacked by an external agent.

If any of the questions make you feel uncomfortable, you may choose to not answer them.

The research team will use the information you provide for research purposes. Should you decide to withdraw from the survey, you can do this by closing the online survey before completing it. Your data will not be saved, and therefore will not be used in the study. This also means that you will not be included in the draw for a gift card.

You may provide your name and be included in the draw for the gift card even if you choose not to finish the survey. This means that when you hit submit, any data that you provide up to that point will be included in the study as the research team will be unable to discriminate your responses from information provided by others. All identifying information will have been removed by the staff of the Health Research Unit before the research team receives the raw data.

- \* **1. Confidentiality and Anonymity:** The on-line survey company, SurveyMonkey, hosting this survey is located in the United States and is subject to U.S. laws. The US Patriot Act allows authorities to access the records of Internet service providers. The security and privacy policy for the web survey company can be found at the following link: <https://www.surveymonkey.com/mp/policy/privacy-policy/>. If you choose to participate in this survey, you should know that your responses to the survey questions will be stored and may be accessed in the U.S.

Data collected using SurveyMonkey includes an IP address, which identifies the specific computer and/or network from which the survey was submitted. This means that the research team cannot guarantee your anonymity and confidentiality.

The staff of the Health Research Unit will conduct an arms-length draw for the gift certificates and notify the winners via the email address you will have the option of providing later in this survey. After the draw, they will clean the survey data of IP addresses, names, and contact information, and provide this de-identified data to the research team.

Your information will not be shared with others. Your information will be reported in aggregate form. Your name will not appear in any report or article published as a result of this study. De-identified survey data will be kept in password-protected files on password-protected computers for a minimum of five years, as required by Memorial University Policy on Integrity in Scholarly Research.

**Questions?** For further information about the study or for any questions about taking part in this study, please e-mail the research team at [writingforsuccess@med.mun.ca](mailto:writingforsuccess@med.mun.ca).

The proposal for this research has been reviewed by the Interdisciplinary Committee on Ethics in Human Research (ICEHR) and found to be in compliance with Memorial University's ethics policy. If you have ethical concerns about the research, such as the way you have been treated or your rights as a participant, you may contact the Chairperson of the ICEHR at [icehr@mun.ca](mailto:icehr@mun.ca) or by telephone at 709-864-2861.

**I have read the above information about the survey and agree to participate in this survey.**

- ☐ **Yes, I am interested in taking this survey.** If you indicate YES, you will be directed to the first survey question.
- ☐ **No, I am not interested in taking this survey.** If you indicate NO, you will be exited from the survey.





## Medical Students' Perceptions of Writing Competence in Medical Education

### STUDY INFORMATION AND CONSENT TO PARTICIPATE (FOR YOUR RECORDS ONLY)

This survey is part of a research study of MUN medical students' approach to developing writing skills and is being conducted by Diana L. Gustafson and her master's student, Emily Pye, both in the Faculty of Medicine.

Taking part in this study is **voluntary**. It is up to you to decide whether you want to complete this survey. Before you decide, you need to understand what the study is about, what risks you might take and what benefits you might receive.

**Purpose of study:** The purpose of this study is to better understand Memorial University medical students' attitudes and experiences with developing writing competencies.

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You may provide your name and be included in the draw for the gift card even if you choose not to finish the survey. This means that when you hit submit, any data that you provide up to that point will be included in the study as the research team will be unable to discriminate your responses from information provided by others. All identifying information will have been removed by the staff of the Health Research Unit before the research team receives the raw data.

**1. Confidentiality and Anonymity:** The on-line survey company, SurveyMonkey, hosting this survey is located in the United States and is subject to U.S. laws. The US Patriot Act allows authorities to access the records of Internet service providers. The security and privacy policy for the web survey company can be found at the following link: <https://www.surveymonkey.com/mp/policy/privacy-policy/>. If you choose to participate in this survey, you should know that your responses to the survey questions will be stored and may be accessed in the U.S. Data collected using SurveyMonkey includes an IP address, which identifies the specific computer and/or network from which the survey was submitted. This means that the research team cannot guarantee your anonymity and confidentiality.

The staff of the Health Research Unit will conduct an arms-length draw for the gift certificates and notify the winners via the email address you will have the option of providing later in this survey. After the draw, they will clean the survey data of IP addresses, names, and contact information, and provide this de-identified data to the research team.

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**I have read the above information about the survey and agree to participate in this survey.**

- ☐ You are asked to drop the completed survey and any corresponding form to **Community Health and Humanities Room 2840A**
- ☐ If you wish to fill out this survey online, please use the following link:  
[https://www.surveymonkey.com/r/MUN\\_medical\\_students](https://www.surveymonkey.com/r/MUN_medical_students)



## Medical Students' Perceptions of Writing Competence in Medical Education

### DEMOGRAPHIC INFORMATION

2. In which year of your undergraduate medical education are you currently enrolled?

- ☐ First year - UGME
- ☐ Second year - UGME
- ☐ Third year - UGME
- ☐ Fourth year - UGME

3. In what faculty did you complete your **undergraduate** degree? Check all that apply if you have completed more than one undergraduate degree.

- ☐ Arts and Humanities (**please specify**)
- ☐ Business
- ☐ Education
- ☐ Engineering
- ☐ Health Sciences
- ☐ Kinesiology
- ☐ Music
- ☐ Nursing
- ☐ Pharmacy
- ☐ Science (**please specify**)
- ☐ Social Work
- ☐ Other (**please specify**)

Please specify:

4. Indicate the level of your language fluency in **English**.

	Excellent		Very Good		Good		Fair		Poor	
Read	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Write	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Speak	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. Indicate the level of your language fluency in **French**.

	Excellent		Very Good		Good		Fair		Poor	
Read	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Write	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Speak	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Indicate the level of your language fluency in any **other language** not listed (if any).

	Excellent		Very Good		Good		Fair		Poor	
Read	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Write	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Speak	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please specify Other #1

7. Indicate the level of your language fluency in any **other language** not listed (if any).

	Excellent		Very Good		Good		Fair		Poor	
Read	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Write	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Speak	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please specify Other #2

8. Did you receive any **formal feedback** on your writing from your instructors during your undergraduate/graduate education?

- ☐ A Great Deal
- ☐ A Moderate Amount
- ☐ Occasionally
- ☐ Rarely
- ☐ Never

\* 9. Do you have a **graduate** degree (master's or PhD)?

- ☐ Yes (go to **Question 10**)
- ☐ No (skip to **Question 11**)



## Medical Students' Perceptions of Writing Competence in Medical Education

### DEMOGRAPHIC INFORMATION

10. In what faculty did you complete your **graduate** degree? Check all that apply if you have more than one graduate degree.

- ☐ Arts and Humanities (**please specify**)
- ☐ Business
- ☐ Education
- ☐ Engineering
- ☐ Kinesiology
- ☐ Music
- ☐ Nursing
- ☐ Pharmacy
- ☐ Public Health
- ☐ Science (**please specify**)
- ☐ Social Work
- ☐ Other (**please specify**)

Please specify:



## Medical Students' Perceptions of Writing Competence in Medical Education

### DEMOGRAPHIC INFORMATION

11. How many years have passed between completing your last degree program and your admission to medical school?

- ☐ No gap
- ☐ 1-year gap
- ☐ 2-3 year gap
- ☐ 4-5 year gap
- ☐ 6+ years

12. Have you received **specific writing instruction** during your undergraduate/graduate education?

- ☐ A Great Deal
- ☐ A Moderate Amount
- ☐ Occasionally
- ☐ Rarely
- ☐ Never

13. Gender:

- ☐ Female
- ☐ Male
- ☐ Transgender
- ☐ I do not identify with female or male or transgender
- ☐ Prefer not to answer



## Medical Students' Perceptions of Writing Competence in Medical Education

### SELF-REPORTED WRITING SKILLS

14. How would you rate your **overall** writing ability?

- ☐ Excellent
- ☐ Very Good
- ☐ Good
- ☐ Fair
- ☐ Poor

15. How would you describe your ability as a **medical student** to communicate in writing?

- ☐ Excellent
- ☐ Very Good
- ☐ Good
- ☐ Fair
- ☐ Poor

16. How would you rank your writing competence as a medical student **when compared to your peers**?

- ☐ Excellent
- ☐ Very Good
- ☐ Good
- ☐ Fair
- ☐ Poor

17. On a scale of **NEVER** (or almost never) to **ALWAYS** (or almost always), rate your level of **confidence** with the following skills:

	Never or Almost Never	Seldom	Sometimes	Often	Always or Almost Always
I successfully conduct library research to locate information to support my ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use appropriate vocabulary and word forms to effectively communicate with a reader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I revise my own writing to improve organization and development of ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I identify problems in my writing and see what should be improved.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use appropriate strategies to fix problems with my writing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have difficulty communicating my ideas in writing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I write good reflection papers for class; reflecting on my own thoughts and experiences.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I write good journal articles.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. How many publications and/or reports had you authored/co-authored **prior** to commencing your medical education?

- ☐ 0  
☐ 1-2  
☐ 3-5  
☐ 5+



19. How many publications and/or reports have you authored/co-authored **since** you began your medical education?

- ☐ 0
- ☐ 1-2
- ☐ 3-5
- ☐ 5+



## Medical Students' Perceptions of Writing Competence in Medical Education

### SELF-REGULATED LEARNING

20. On a scale of **NEVER** (or almost never) to **ALWAYS** (or almost always), rate your level of agreement with each of the statements listed below:

	Never or Almost Never	Seldom	Sometimes	Often	Always or Almost Always
I check my work after I've finished before handing it in.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use other resources to check my work (e.g., other people, the internet).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find ways to test myself after having learned a topic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I summarize important facts into main points while reading passages.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I create an outline before writing a paper.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I highlight important points while reading passages.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I organize my notes to ensure I am clear about what I have to learn for a certain topic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I set goals for myself to complete tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

21. On a scale of **NEVER** (or almost never) to **ALWAYS** (or almost always), rate your level of agreement with each of the statements listed below:

	Never or Almost Never	Seldom	Sometimes	Often	Always or Almost Always
I seek out additional information other than what I am given about a topic I am studying.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I take useful notes in class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
While studying, I seek out an environment that optimizes my concentration.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I take breaks from my work when I feel tired.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I reward myself for completing tasks for school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am able to memorize information for tests.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I complete practice exercises to make sure I understand certain topics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. On a scale of **NEVER** (or almost never) to **ALWAYS** (or almost always), rate your level of agreement with each of the statements listed below:

	Never or Almost Never	Seldom	Sometimes	Often	Always or Almost Always
I ask <b>my peers</b> questions when I do not understand a particular topic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I ask <b>my instructor</b> questions when I do not understand a particular topic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I ask <b>others</b> (e.g., librarian) tutors questions when I do not understand a particular topic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I review notes while studying for a test.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I review past assignments and other past school work while studying for a test.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I review my textbook (if there is one) while studying for a test.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I force myself to study until I have a good understanding of the learning objectives.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I refer to others' work for ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I just do what the instructor expects of me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



## Medical Students' Perceptions of Writing Competence in Medical Education

### WRITING IN MEDICAL EDUCATION

23. How likely are you to attend a workshop or clinic offered by MUN to improve your writing skills?

- ☐ Very Likely  
☐ Likely  
☐ Don't Know  
☐ Unlikely  
☐ Very Unlikely

24. How likely are you to attend a pre- or post-conference workshop or clinic to improve your writing skills?

- ☐ Very Likely  
☐ Likely  
☐ Don't Know  
☐ Unlikely  
☐ Very Unlikely

25. On a scale of **STRONGLY DISAGREE** to **STRONGLY AGREE**, rate your level of agreement with each of the statements listed below:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I receive instruction on how to write in medical school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I receive helpful feedback on my writing from my instructors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I understand what is expected of me and my writing on various assignments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use resources available to me to help with my writing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find the writing resources at the university effective in improving my writing skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important to have writing practices incorporated into medical education.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy reading articles in which issues of medicine are discussed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
One of the most important goals of medical school is to develop students' life-long learning skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rapid changes in medical science require constant updating of knowledge and development of new professional skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



## Medical Students' Perceptions of Writing Competence in Medical Education

### ADDITIONAL COMMENTS

Thank you for taking the time to participate!

23. Do you have any additional comments, questions, or concerns you would like to share?



## Medical Students' Perceptions of Writing Competence in Medical Education

### DRAW

24. Would you like your name to be entered in a draw for one of ten **\$20 Tim Horton's gift cards**?

- ☐ **Yes** (Please click the following link now to enter your e-mail address for your chance to win:  
[https://www.surveymonkey.com/r/tim\\_hortons\\_draw](https://www.surveymonkey.com/r/tim_hortons_draw). Note: The contact information you provide will be in no way linked to the answers you provided in this survey, they are kept completely separate. The information you provide will be used by the Health Research Unit to contact the winners.)
- ☐ **No**





## Medical Students' Perceptions of Writing Competence in Medical Education

One more question before you  
go...

25. Would you like to receive information via e-mail about taking part in a **focus group** interview?

- ☐ **Yes** (Please click the following link now to enter your e-mail address to learn more about participating in the focus groups: [https://www.surveymonkey.com/med\\_focus\\_groups](https://www.surveymonkey.com/med_focus_groups). Note: The contact information you provide will be in no way linked to the answers you provided in this survey, they are kept completely separate. By providing your contact information, you are NOT consenting to participate in a focus group, we will just contact you with further information.)
- ☐ **No** (Your participation in this survey ends here.)



## Medical Students' Perceptions of Writing Competence in Medical Education

### ADDITIONAL COMMENTS

**Thank you for taking the time to participate!** If you would like to be entered in a draw for one of ten \$20 Tim Horton's gift cards, or contacted about upcoming focus groups, please fill out the detached **corresponding form**. Please drop all completed documents to the following location:  
**Community Health and Humanities Room 2840A.**

26. Do you have any additional comments, questions, or concerns you would like to share?

**C2: Cover letter to study participants.**

Recruitment Email to medical students

sent by the office of UGME

on behalf of the Research Team

E-mail Subject line: Memorial University – Invitation to take part in a research study

Dear student,

The Medical Graduates' Society at Memorial University has funded Dr. Diana Gustafson and her master's student, Emily Pye, to conduct a study about your views and experiences with developing your written communication skills.

The following information is from the research team:

We are interested in better understanding what you want and need to develop your writing competence as part of your professional tool kit. This spring, we are conducting a brief survey that will be administered online, and will be further explained after class on a predetermined date.

Participation involves completing a survey that will take about 7-10 minutes to complete. There are no right or wrong answers to our survey questions. We are only interested in your thoughts and opinions.

Taking part in the survey is voluntary and you can refuse to answer any question you do not wish to answer. Your name will never be reported in any papers or reports prepared from the survey data. Taking part or not taking part in this study will not affect your status or any educational opportunities that you have available to you.

The information collected from this study will be used for research purposes and contribute to the literature about self-regulated learning and writing competency in medical school curricula.

**Should you wish to participate, please contact Emily Pye at [emp802@mun.ca](mailto:emp802@mun.ca) for the survey link!**

If you have any questions about the study, send an e-mail to [writingforsuccess@med.mun.ca](mailto:writingforsuccess@med.mun.ca). You will also have the opportunity to ask questions after class prior to deciding whether you want to take the survey.

Thank you for considering taking part in this study.

Respectfully

Dr. Diana L. Gustafson

### Appendix D: Writing Self-Efficacy Scale (Graham et al., 1993)

Table 19

#### *Writing Self-Efficacy Scale Items\**

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When writing a paper,	a) It is easy for me to get ideas.
	b) It is hard for me to organize my ideas.
	c) It is easy for me to get started.
	d) I find it easy to make all the changes I need to make.
	e) It is easy for me to write my ideas into good sentences.
	f) It is hard for me to keep the paper going.
	g) It is hard for me to correct my mistakes.
When my class is asked to write a	h) Report, mine is one of the best.
	i) Story, mine is one of the best.
	j) Book report, mine is one of the best.

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\* *Note:* Taken from Graham et al., 1993

### Appendix E: Sample Size Equation

$$\text{Sample Size} = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left( \frac{z^2 \times p(1-p)}{e^2 N} \right)}$$

Population Size = N | Margin of error = e | z-score = z

e is percentage, put into decimal form (for example, 3% = 0.03).

## Appendix F: Ethics Approval and Extension



### Interdisciplinary Committee on Ethics in Human Research (ICEHR)

St. John's, NL, Canada A1C 5S7  
Tel: 709 854-2561 icehr@mun.ca  
www.mun.ca/research/ethics/humans/icehr

ICEHR Number:	20170937-ME
Approval Period:	October 21, 2016 – October 31, 2017
Funding Source:	Medical Graduates Society/Dr. Wallace Ingram Award (RGCS: 20160513)
Responsible Faculty:	Dr. Diana Gustafson Faculty of Medicine
Title of Project:	<i>Medical Students' Perspectives on Writing Competence in Medical Education</i>
Title of Parent Project:	<i>You are what you write: Facilitating medical student success through improved writing competency</i>
ICEHR Number:	20170280-ME

October 21, 2016

Miss Emily Pye  
Division of Community Health and Humanities  
Faculty of Medicine  
Memorial University of Newfoundland

Dear Miss Pye:

Thank you for your submission to the Interdisciplinary Committee on Ethics in Human Research (ICEHR) seeking ethical clearance for the above-named research project. The Committee has reviewed the proposal, and subsequent communication, and agrees that the proposed project is consistent with the guidelines of the *Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans* (TCPS2). *Full ethics clearance* is granted for one year from the date of this letter.

If you need to make changes during the course of the project, which may raise ethical concerns, please submit an amendment request, with a description of these changes, via your Researcher Portal account for the Committee's consideration.

Additionally, the TCPS2 requires that you submit an annual update to the ICEHR before October 31, 2017 to request renewal of your clearance, if you plan to continue the project, or closure when the project no longer requires contact with human participants, is completed and/or terminated.

Annual updates and amendment requests can be submitted from your Researcher Portal account by clicking the *Applications (Submitted – Post Review)* quick link on your Portal homepage.

We wish you success with your research.

Yours sincerely,

Russell J. Adams, Ph.D.  
Chair, Interdisciplinary Committee on  
Ethics in Human Research  
Professor of Psychology and Pediatrics  
Faculties of Science and Medicine

RA/lw

cc: Supervisor – Dr. Diana Gustafson, Faculty of Medicine, Division of Community Health and  
Humanities  
Director, Research Grant and Contract Services



ICEHR Approval #:	20170937-ME
Researcher Portal File #:	20170937
Project Title:	<i>Medical Students' Perspectives on Writing Competence in Medical Education</i>
Principal Investigator:	Miss Emily Pye Faculty of Medicine\Division of Community Health and Humanities
Supervisor:	Dr. Diana Gustafson
Associated Funding:	20160513
<b>Clearance expiry date:</b>	<b>October 31, 2018</b>

Dear Miss Pye:

Thank you for your response to our request for an annual update advising that your project will continue without any changes that would affect ethical relations with human participants.

On behalf of the Chair of ICEHR, I wish to advise that the ethics clearance for this project has been extended to **October 31, 2018**. The *Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans* (TCPS2) requires that you submit another annual update to ICEHR on your project prior to this date.

We wish you well with the continuation of your research.

Sincerely,

*Debby Gulliver*  
*Secretary, ICEHR*



### Appendix G: Non-Significant SRL Categories Demographics

Table 20

*One-Way ANOVA of Demographics and Self-Evaluation SRL Category*

Variable	Group	N	SRL		ANOVA	
			M	SD	F	p
Undergrad year	First	15	3.77	.61	2.86	.067
	Second	18	3.27	.63		
	Fourth	17	3.70	.77		
Graduate degree	Yes	15	3.62	.55	0.12	.73
	No	37	3.55	.76		
Gender	Male	23	3.42	.64	0.92	.41
	Female	28	3.69	.75		
	Prefer not to answer	1	3.67			
Fluent languages	One	5	3.27	.43	1.23	.30
	Two	37	3.66	.69		
	Three	10	3.67	.81		
Number of gap years	No gap	27	3.63	.69	1.61	.20
	1 year	11	3.18	.60		
	2-3 years	11	3.79	.78		
	4+ years	3	3.67	.67		

Table 21

*One-Way ANOVA on Demographics and Environmental Structuring SRL Category*

Variable	Group	N	SRL		ANOVA	
			M	SD	F	p
Undergrad year	First	15	3.80	.43	1.91	.16
	Second	18	4.05	.50		
	Fourth	17	4.14	.55		

<b>Graduate degree</b>	Yes	14	4.00	.52	0.0010	.97
	No	36	4.01	.51		
<b>Gender</b>	Male	23	3.99	.41	0.058	.81
	Female	27	4.02	.59		
<b>Fluent languages</b>	One	4	4.00	.47	0.93	.40
	Two	36	3.95	.50		
	Three	10	4.20	.55		
<b>Number of gap years</b>	No gap	25	3.87	.50	1.47	.24
	1 year	11	4.23	.66		
	2-3 years	11	4.06	.36		
	4+ years	3	4.11	.19		

Table 22

*One-Way ANOVA on Demographics and Rehearsing and Memorizing SRL Category*

Variable	Group	N	SRL		ANOVA	
			M	SD	F	p
<b>Undergrad year</b>	First	15	4.00	.53	.36	.70
	Second	18	3.78	1.07		
	Fourth	17	3.82	.56		
<b>Graduate degree</b>	Yes	14	3.64	.50	1.57	.22
	No	36	3.94	.84		
<b>Gender</b>	Male	23	3.93	.70	0.40	.53
	Female	27	3.80	.84		
<b>Fluent languages</b>	One	4	3.75	.65	0.61	.55
	Two	36	3.81	.79		
	Three	10	4.10	.77		
<b>Number of gap years</b>	No gap	25	3.76	.86	0.50	.69
	1 year	11	3.82	.87		
	2-3 years	11	4.09	.49		
	4+ years	3	4.00	.50		

Table 23

*One-Way ANOVA of Demographics and Seeking Social Assistance SRL Category*

Variable	Group	N	SRL		ANOVA	
			M	SD	F	p
Undergrad year	First	15	3.13	.52	3.13	.053
	Second	18	2.67	.65		
	Fourth	17	3.11	.66		
Graduate degree	Yes	14	3.00	.72	0.082	.78
	No	36	2.94	.62		
Gender	Male	23	3.00	.59	0.14	.71
	Female	27	2.93	.69		
Fluent languages	One	4	2.67	.82	0.54	.59
	Two	36	3.01	.62		
	Three	10	2.90	.70		
Number of gap years	No gap	25	2.89	.68	0.25	.86
	1 year	11	2.97	.53		
	2-3 years	11	3.09	.73		
	4+ years	3	3.00	.58		

### Appendix H: Survey Comments

Participant	Comment
1	The amount of writing assignments, reflections, etc. in medical school is ridiculous. Many topics are repetitive and the related classes take up a huge portion of curricular time (classes that are 3 hours long could easily be 1). Then, we are rushing through scientific concepts that are integral to medical knowledge. The curriculum and assessment schedule is the poorest I've seen throughout my three degree programs.
2	During my studies in medical education and science undergrad we are often expected to convey thoughts, ideas, and information effectively but outside of entry year english do not receive formal teaching on writing. We often receive feedback on things that we write but the comments generally focus on the content and not on appropriate use of language to convey that content. I remember in my final year of my undergrad I received a poor mark on one paper I wrote because my writing was ""poor and unclear"" but I had never received any feedback remotely like this before or since. This was a bit of a wake up call for me as I realized that maybe my writing was not what I thought it was (although I also believe the expectations of instructors vary and perhaps some are too high).
3	Feedback on writing in the curriculum varies and seems to be dependent on the assessor that grades the papers. It is not unusual to have multiple faculty members assigned the task of grading a particular assignment or paper. Sometimes in-depth feedback is provided, other times one might receive no useful feedback. There also seems to be a lot of focus on personal and emotional reflection in writing in the medicine program at MUN. While I agree that this is important, I believe there should be an increased focus on writing in the context of medical literature and other clinical applications. Sometimes the feedback provided seems too abstract, and would perhaps make more sense in the context of an arts program assignment.
4	This is a very suitable survey as I believe there should be a greater focus on developing writing skills in medical school. Medical school students come from a wide variety of backgrounds so there should be some opportunities available for students to work on writing skills.
5	Great idea! Would love to see some positive changes come as a results of this survey - particularly more writing training offered to Medicine students. Personally, I have no experience with reflective writing and would love to have a course/ workshop in what is expected of us as students in terms of our writing.
6	During the preclerkship years there is a high number written assignments, which are placed on top of an extremely heavy workload. I have observed

that students often take less time, and have less energy to produce high quality writing of these assignments. Many times, individuals simply write enough to hit the word count and have little care for content. This is simply my own observation.

7

Too many reflective assignments